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THE
LARYNGOSCOPE.

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RHINOLOGY IN CHILDREN, RESUME OF AND COMMENTS ON THE LITERATURE FOR 1946.

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In this resumé of the literature pertaining to rhinology in children for 1946, the same journals have been covered as in previous reviews, but because of the widespread interest in the antibiotics, several other journals devoted to allergy and to diseases of children have also been included. The same order of discussion has been followed as in previous years.

GENERAL ARTICLES ON RHINOLOGY AND ACCESSORY SINUS DISEASE.

Hare and MacKenzie,[1] from the Connaught Medical Research Laboratories, University of Toronto, discuss the probable methods by which the bacterial and virus infections of the nasopharynx are disseminated. By culture plates placed in various positions relative to the subject's mouth they determined that few organisms reach the atmosphere when the subject breathes quietly, but that the number rapidly increases with coughing, blowing, and particularly sneezing. Only a proportion of carriers of Group A hemolytic streptococci and diphtheria bacilli, in the acute stages of infection, expel these organisms, and the organisms which they do expel will then drop to a surface below the level of the mouth. Without coughing or sneezing, it would be almost impossible to project any considerable number of organisms into the

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mouth of a person on the same level and only 12 inches away. Thus, the more important type of spread is secondary, by organisms falling on the clothing or bedding, drying, and when these are disturbed the organisms are dispersed into the atmosphere and so transferred to the nasopharynx of others.

Although similar studies on virus particles have not been attempted, observations indicate that the method of spread is similar to that of bacterial organisms; *i.e.*, secondary, rather than from person to person. They conclude that, in view of this, the prevention of virus infections by ultraviolet light or aerosols may prove to be extremely difficult, whereas it may be much easier in the case of bacterial infections. This should be borne in mind before expensive installations are contemplated.

Smith and others[2] took part in a round table discussion on sinusitis which provides a survey of the subject very useful to the general practitioner.

Thacker[3] presents such a long paper on the causes, effects and treatment of allergic rhinitis that it would be unfair as well as impossible to condense it in this resumé. His summary of his paper follows without comment.

Contrary to general belief, his series revealed that about one-half of the cases of chronic nasal allergy were due to both inhalants and ingestants, approximately one-fourth were due exclusively to inhalants, and a like number were due to foods alone. Inhalant allergens must not be overlooked as the cause of associated gastrointestinal disturbances, nor ingestants as factors associated with upper respiratory symptoms.

Nasal smears positive for eosinophils are diagnostic of allergy, but a negative smear does not rule it out. There is no correlation between blood eosinophilia and nasal smear eosinophilia. Blood eosinophilia may or may not be increased in patients with an associated asthma. No relationship exists between the percentage of eosinophilia and the number of

allergens to which the patient is sensitive, or the degree of skin reaction.

The time element is important in producing sinal changes in allergy. The degree of sinal involvement is roughly proportional to the length of time the allergy has existed. If all the paranasal sinuses are hazy to transillumination and X-rays, this is diagnostic of an existing allergy. If only one sinus or a unilateral group of sinuses shows cloudiness, this is almost certain to be on a truly infective basis. It has been the experience in this department that children with allergy have a tendency to have hypertrophy of the tonsils and adenoids. If obstructive symptoms are present, removal of these tissues should be done only after the allergy is brought under control. If such a procedure is followed, there is no evidence that such surgery will produce an aggravation of the allergy.

Good results were obtained in controlling the symptoms of nasal allergy and the associated complaints by the following regimens: *1*. The use of drugs in the nose as a spray (neosynephrine hydrochloride 0.25 per cent, privine hydrochloride 0.1 per cent, or ephedrine 1 per cent in isotonic solution of sodium chloride) and the use internally of aminophylline 3 gr. (0.2 gm.) and nadin for associated asthma for temporary benefit; the use of benadryl in 50 mg. capsules four times daily for the temporary relief of nasal congestion in vasomotor and perennial allergic rhinitis has been somewhat encouraging. *2*. The elimination of allergens and desensitization with specific allergens. *3*. The control of allergy plus conservative nasal surgery when indicated. *4*. Nonspecific desensitization with histamine derivatives; this was not found to be particularly effective but is worthy of trial when the preceding measures fail. *5*. The injection of the turbinates with a sclerosing agent if all other measures fail to give the patient relief.

COMPLICATIONS OF ACCESSORY SINUS DISEASE.

Weille[4] reports the case of a 14-year-old white school boy suffering from severe acute pansinusitis of the left side, who

was treated successfully for this condition by the intramuscular injection of penicillin, but who, while undergoing this therapy, most extraordinarily, developed a relatively sterile maxillary and ethmoid sinusitis on the right side.

The first set of Roentgenograms showed, inter alia, porosity of the anterior wall of the left frontal sinus. This was interpreted pathologically as vascular absorption of bone caused by dilated and engorged vessels in this location, probably with granulation tissue around the dilated vessels. Since the veins in the diploe of the anterior wall of the frontal sinus are in direct continuity with those of the squama of the frontal bone, it seemed entirely possible that spreading osteomyelitis might develop. For this, penicillin was injected intramuscularly in a dosage of 100,000 to 200,000 units per day for three weeks. Such therapy was successful.

The extraordinary fact, however, that a relatively sterile right maxillary and ethmoid sinusitis developed in spite of the penicillin seemed to be of sufficient importance to be reported.

When this complication arose, it was assumed that an organism not affected by penicillin must be the etiologic agent and that some Gram-negative organism would be found. The first surprise was that pus from the right middle meatus yielded a sterile culture while the penicillin therapy continued, but that when this therapy was discontinued, a day later, it was possible to recover the same organism from the right middle meatus as had been found in the left middle meatus. The explanation appeared to be that this particular strain of coagulase-positive staphylococcus aureus was itself resistant to penicillin.

Watson[5] reports the recovery of a boy, aged 13, who had bilateral frontal sinusitis with osteomyelitis of the frontal bone and left antrum sinusitis.

A headache of five days' duration had followed a cold and diving in a public swimming bath.

He was admitted with a violent frontal headache and great swelling of the left eyelid, with edema of the left side of the

forehead extending almost to the hair margin, and there was a slight amount of pus in the left middle meatus.

A diagnosis of acute bilateral frontal sinusitis with osteomyelitis of the frontal bone and left antrum infection was made. Penicillin 1 cc., 10,000 units every three hours, was administered with ephedrine spray twice daily and inhalations of menthol and the use of a headlight bath every four hours.

An abscess developed in the midline of the forehead, two inches above the glabella. One cc. of pus was evacuated after incision. The frontal bone was exposed and explored and no abnormality found. The patient was discharged 22 days after operation.

The author states that the left frontal sinus had a small upward extension near the midline where osteomyelitis developed, no doubt due to thrombosing of anastamosing vessels of the mucoperiosteum lining the sinus and the diploe of the frontal bone. Had he been younger, he has no doubt that he should have plunged into major surgery when he first saw the patient, with the consequent disfigurement of the boy. He comments that this case demonstrated the efficacy of penicillin in both osteomyelitis and sinusitis. The improvement in the boy's general condition after 24 hours was amazing.

Rushton[6] reports recovery from subdural abscess secondary to acute frontal sinusitis.

A girl, aged 12, with a 10 days' history of pyrexia, increasing lethargy, and frontal headache, had slight edema over the bridge of the nose and over the right eyebrow. There was slight tenderness to pressure over the floor of the right frontal sinus. The right middle turbinate was bright red and swollen. X-ray revealed opacity of the right antrum and both frontal sinuses.

Under local anesthesia the right antrum was punctured and thick, greenish, foul smelling pus washed out. A short cannula was left in the antrum and it was aspirated every three hours, and penicillin 2,000 units per cc. was injected through

the indwelling cannula. Twenty thousand units of penicillin were given intramuscularly and continued every three hours.

The next day she appeared more lethargic and the swelling had increased, spreading to the left side and to both upper eyelids. There was well marked bilateral papilloedema, some swelling of the upper lids, and paralysis of the right external rectus muscle and possible slow cerebration. Five cc. of clear fluid were withdrawn by lumbar puncture under normal pressure.

The left antrum was punctured and found to be uninfected. Right intranasal antrostomy was performed. A large incision was made over the right frontal sinus and the sinus opened. It was found to be full of thick, yellow pus, the lining mucosa being only slightly edematous. It was seen to fill up with pus after it had been emptied. The posterior wall appeared intact, but after removing almost the entire anterior wall, a pinpoint hole was seen in the lateral corner of the posterior wall, through which a thick stream of pus was pouring. On opening the posterior wall, about 22 cc. of thick blood-stained pus poured out under considerable pressure. The opening was enlarged and the dura was found to be intact and covered with fine, red granulations. The abscess cavity spread backwards towards the temporal bone; probe could be passed easily backwards and laterally for four inches. The mucosa of the floor of the sinus and the frontonasal duct were not interfered with. The left frontal sinus was then opened by breaking down the intersinus septum and more thick, yellow pus evacuated. A narrow rubber catheter was placed in the abscess cavity and in the left frontal sinus. The wound was then closed after a small piece of corrugated rubber drain had been placed in the right frontal sinus.

The intramuscular penicillin was continued. Sulfadiazine gm. 1 was given, followed by gm. $\frac{1}{2}$ every three hours. After aspiration of any pus or serum from the two catheters, the equivalent amount of penicillin, 2,000 units per cc., were injected every three hours.

The pus from the frontal sinus produced a culture of penicillin-sensitive staphylococcus albus.

There was an immediate and lasting improvement of her general condition. The next morning she was bright and cheerful and one realized only then the full degree of her previous lethargy. Her temperature fell and remained normal. The paralysis in her right external rectus disappeared on the first day.

The only complication occurred on the third day when she developed a painless fluctuant swelling in the midline on the upper part of her forehead. An incision was made into this secondary abscess and 10 cc. of thick pus were evacuated.

On the seventh day the stitches and the rubber drain were removed. On the eighth day the sulfadiazine was discontinued. On the tenth day the catheters were removed, but intramuscular penicillin was continued until the sixteenth day.

She was discharged quite fit.

Although almost all of the anterior wall of her right frontal sinus was removed, there is only a very small depression.

Infections about the region of the face have long been treated with great repect and special care because of the constant threat of involvement of the cavernous sinus and the almost invariably fatal outcome of this complication.

Occasional recoveries have been reported. In many of these the accuracy of the diagnosis has been questioned. The differential diagnosis must take into account orbital cellulitis, aseptic cavernous sinus thrombosis and septic cavernous sinus thrombophlebitis.

Welty[7] presents a case report of undoubted bacterial cavernous sinus thrombophlebitis in a boy of 13, where recovery occurred following treatment with sulfadiazine, penicillin and heparin.

The infection commenced four days before admission, in a furuncle on the inner aspect of the right ala nasi. He became rapidly critically ill. Blood culture on admission showed 65 colonies of hemolytic staphylococcus aureus per cc. He became increasingly confused and finally stuporous. A specimen of

the spinal fluid revealed 1,120 white blood cells per cm., but both smear and culture of the spinal fluid failed to demonstrate any organisms. For four days his life was despaired of, but by the seventh day he had become quite rational and from then on showed continued clinical improvement. He was discharged on the twenty-seventh day.

The treatment consisted of: *a.* 46 grs. of sulfadiazine administered over a period of 12 days; *b.* 280,000 units of heparin, injected over a period of 16 days; *c.* 3,600,000 units of penicillin, given over a period of 23 days, the majority of doses being given intravenously during the first 10 days.

Since heparin was introduced into the therapy of this disease, some have hesitated to use the drug because of the extensive bleeding, especially into the brain, which at times has followed its use. The patient's condition was so desperate that this risk seemed justified. The clotting time was kept at 20 to 30 minutes, thereby reducing the risk from hemorrhage.

The patient has been seen several times since discharge. Vision is 6/6 in the left eye and 6/12 in the right eye. There is still some weakness of the external rectus muscle and slight ptosis of the lid. These are sequelae which have been noted by others, and further return of function is anticipated.

TREATMENT OF ACCESSORY SINUS DISEASE.

Robison[8] considers that tissue fluid stagnation in the lymph bed of the mucosa of the paranasal sinuses plays a part in the pathogenesis of maxillary sinusitis. Diagrams show his conception of acute, subacute and chronic stages of maxillary sinusitis and the appropriate treatment.

Excessive intranasal tissue turgescence is a constant finding in acute allergic sinusitis. If the latter is mild, irrigation of the sinus will relieve nasal stenosis, but, if it is severe and tissue fluid has become trapped in the mucosa of the sinus, fistulization by sinus puncture will definitely hasten recovery.

Stagnation of tissue fluid in the sinus mucosa in subacute allergic sinusitis is always bilateral and may continue for

years. In this stage he states that application of local pressure by a pressure balloon to the maxillary sinus mucosa may cause stenosis and asthma to disappear.

Long-continued retention of excessive tissue fluid in the interstitial spaces of the sinus mucosa causes chronic allergic sinusitis. Fibrosis occurs in places and dilated tissue spaces in others, and a rise in pressure in the latter produces polypoid formations. He advocates removal of the mucosa in this stage so that a new lining membrane containing a new lymphatic system may be formed in the sinus.

Wolf,[9] because of the widespread use of nasal tamponades saturated with a mild protein silver, gave this therapeutic procedure a thorough trial over several years and found: the action of the medication is due to its free silver ions; when the nose is packed tightly some ciliary damage results; there is no particular technique of application which will produce superior results. He warns that there is a danger from argyria after prolonged use. He concludes that prolonged nasal tamponage as routine therapy for chronic sinusitis should not be prescribed by either the general practitioner or the rhinologist.

NASAL ALLERGY.

The rôle played by the eosinophile in allergy is still a disputed point. Hence the importance to the student of nasal allergy of every new approach to the study of the eosinophile.

At St. Bartholomew's Hospital recently it became necessary to determine with a considerable degree of accuracy the eosinophile count of a series of patients while their limited staff was unable to undertake the large number of differential counts required.

Discombe[10] reports a study made to determine the accuracy of a modification of Dunger's method of counting eosinophiles in a hemocytometer and then discribes the method in detail.

The method proved invaluable; it was possible to demonstrate a mild degree of eosinophilia (400-500 per cm.) in most

quiescent asthmatics, but its principal use was in following the treatment of patients with injections of gold salts. Hulst (1937) had shown that toxic manifestations of chrysotherapy are associated with eosinophilia and he recommended routine differential counts for its early detection. In a few personal cases without toxic manifestations no change in the eosinophile count could be detected; but in one case of dermatitis, 1,100, and in a case of stomatitis, 8,800 eosinophils per cm. were found. These counts returned to normal only after six or seven weeks.

He concludes that it is quicker and more accurate to determine the eosinophile count of blood in a hemocytometer, using a special diluting fluid, than to do a differential count, using stained films.

The normal range of eosinophils is 0.24 per cm. Not more than 1 per cent of normal subjects should have counts above this.

Houser,[11] in a short discussion of the allergic nose, states that it is the duty of the otolaryngologist to be able to recognize the condition and to recommend proper therapeutic procedures.

With the exception of acute, subacute and chronic infections, allergy is the commonest cause of nasal symptoms. A physician should always look with suspicion on the patient, adult or child, who has a constant nasal cold. He believes that patients will always fall into one of the following five categories: *1.* the patient with suspected allergy; *2.* the patient with definite allergy without demonstrable sinus infection; *3.* the patient with definite allergy with sinus infection; *4.* the patient with definite allergy with polyposis; and *5.* the patient with definite allergy with polyposis and sinus infection.

He deals with each of these divisions.

He emphasizes that in the allergic nose complicated by sinus infection, elimination of the infection is of primary importance. This is by no means easy. If large nonreversible polyps

are present, they should be removed. Badly deflected nasal septums must be surgically corrected. Large pneumatic middle turbinates may call for removal. Ethmoid and sphenoid sinuses may demand surgical attention.

After mentioning many methods of procedure, he concludes by saying that it must be remembered that all allergic nasal problems are difficult problems. Each is a law unto itself, and what works wonders in one may fail in another. Teamwork between rhinologist and allergist is of the utmost importance, and where such a relationship exists, as a rule at least some relief can eventually be obtained for the patient with this most distressing and annoying ailment.

Levin[12] reports that benadryl relieved 60 per cent of 223 patients with various allergic symptoms. He considers its action entirely palliative and that withdrawal is followed by recurrence of symptoms. Fifteen children suffering from asthma and 10 having hay fever were relieved; six reactions occurred in 86 per cent and 33 per cent, respectively, of these. The drug was not very effective in allergic rhinitis.

Elder[13] states that the earliest manifestations of allergy seen in pediatrics are: rash, allergic colic, allergic rhinitis and asthma. Allergic rhinitis in the young child, he describes in some detail because, although it is one of the most annoying types of allergy, much may now be done for it.

The new therapeutic agent is administered to the severely allergic patient in an effort to develop an antihistamine substance. It is histamine azoprotein sold under the trade name of hapamine.

Up to the present time he has treated 17 cases of allergic rhinitis in children with hapamine. Of these, seven cases had asthma; three also had atopic dermatitis; 14 were under the age of five. The results have been almost too good to believe. All of these children have responded to hapamine. There are two outstanding things about the use of hapamine in children. The first is the fact that apparently hapamine causes no pain. Even these young irritable children, after the second

or third injection, will walk into the office, put their arms out and permit you to inject them without any fear. The second thing is the very noticeable change in the children's dispositions. In contrast to a difficult, irritable, unmanageable child, all of these cases have developed normal, happy dispositions, characteristic of healthy children. (The number of cases supporting this report of a new therapeutic agent is very small and there was no control series.)

THE ANTIBIOTICS.

Henderson and Couper[14] present a long, very carefully and clearly written paper dealing with the use of sulfonamides in the treatment of infections in infancy. The cases were treated in Alder Hey Children's Hospital, Liverpool, which deals with approximately 1,000 infants per annum, and in Walton Hospital, Liverpool, which has a large maternity department. A standardized scheme of treatment was adopted for the purposes of this investigation.

The paper is divided into various sections, and in addition to the comments at the end of each of these there is a discussion at the end of the paper.

Only those conclusions which deal with the upper respiratory tract are given below.

A description is given of 415 infants, suffering from various infections, the majority of patients being treated with drugs of the sulfonamide group. On the whole, these drugs are well tolerated by infants. Sulfamezathine, sulfathiazole, sulfadiazine and sulfapyridine do not produce striking results in upper respiratory infection and bronchitis. They exert little effect in preventing the development of otitis media. When otitis media occurs alone, as it often does, the sulfonamides (particularly sulfathiazole and sulfadiazine) constitute a therapeutic advance, but not as great an advance as could be wished. It is felt that once mastoiditis has supervened, sulfonamides will not influence the progress of the disease.

Lehr, Slobody and Greenberg[15] consider that, despite the advent of penicillin, the sulfonamides will undoubtedly con-

tinue to play an important rôle in the therapy of human infections. The reasons become obvious if one considers briefly the comparative merits of penicillin and the sulfonamide compounds. With the exception of staphylococcal septicemia and the treatment of infections due to nonhemolytic streptococci and streptococci of the viridans type, penicillin has not proved superior or only slightly superior to the sulfonamides commonly employed in bacterial infections. The sulfonamides, furthermore, are effective against the primary and secondary invaders of bacillary dysentery, Escherichia coli, and to some extent also against bacillus proteus, bacillus pyocyaneus and hemophilus influenzae, whereas penicillin is ineffective against these organisms. In addition, penicillin fastness is being observed with increasing frequency.

In the light of these considerations, it appears highly desirable to continue all efforts which might lead to elimination or at least diminution of serious toxic reactions caused by the sulfonamides. The most dreaded of these are damage to the blood building organs and renal complications. The first, which may lead to agranulocytosis, is fortunately rare; it can neither be anticipated nor prevented, although reduction in the total period of therapy might possibly decrease the incidence of damage to the hematopoietic system. Kidney lesions, on the other hand, are encountered frequently. They are caused predominantly by intratubular deposition of sulfonamide crystals; in other words, by a mechanical factor; their incidence is, therefore, amenable to reduction with the help of adequate precautionary measures.

One of the authors found that effective prevention of renal complications could be obtained by the therapeutic employment of sulfonamide mixtures instead of individual compounds, with the result that a mixture containing equal parts of sulfadiazine and sulfathiazole was investigated with regard to its absorption, excretion, therapeutic efficacy and toxicity in children and infants.

The sulfadiazine-sulfathiazole mixture was quickly absorbed from the gastrointestinal tract and readily eliminated by way of the kidneys. Peak levels as high or higher than

from equal weight amounts of sulfadiazine were reached in the blood within four hours after drug administration.

The therapeutic results with the sulfonamide combination in 200 children with acute bacterial infections were uniformly satisfactory and conspicuous in many instances because of the speed of clinical improvement and cure.

The clinical toxicity of the sulfadiazine - sulfathiazole mixture was remarkably low. Crystalluria was infrequent, despite the intentional omission of adjuvant alkali therapy and no signs of renal irritation were encountered. The incidence of allergic reactions also appeared decreased.

Rothman[16] states that the principal clinical handicap in the use of penicillin and the sulfonamide compounds is the inability to determine the duration of treatment necessary to eradicate an infection. This difficulty is due to the rapid disappearance of all clinical evidence of the disease before a cure has been completed. The so-called masking of symptoms is responsible for the premature discontinuance of medication. Recurrences of infection result not infrequently, and two or three courses of treatment may be required before recovery finally ensues.

This problem creates two potential dangers; namely, that an infection may be controlled but not eradicated, and that drug-resistant strains of organisms may develop and may be disseminated. In the treatment of mild infections of the respiratory tract, lymphadenitis and low grade cutaneous infections with cellulitis, a relapse represents more of an annoyance to the patient than a matter of serious import, as the ultimate prognosis is almost invariably good. Much more grave are the relapses of the meningitic disorders, in which the early cessation of treatment may prove a contributory factor in the production of permanent damage to the brain and the cranial nerves.

Bacteriologic procedures are helpful but have many limitations. Following the administration of these drugs, the causative organism, as a rule, cannot be isolated from the

mucous membranes of the nose and throat in disorders of the upper respiratory tract. Since the organisms often reappear after the use of the drug has been discontinued, it is obvious that this period of "cultural latency" is no criterion of a cure; moreover, the presence of a positive culture would not necessarily signify that a cure had not been effected, but might well suggest the possibility of a convalescent carrier. All such studies merely suggest that the drugs act chiefly as bacteriostatic agents.

It is unfortunate that the most delicate test available, namely, the sedimentation test, may show a lag of several days to a few weeks before the results return to a normal level after clinical evidence of the termination of an infection. Consequently, an elevation of the sedimentation rate during a symptom-free period cannot be interpreted as a basis for additional chemotherapy.

In the absence of a laboratory test for persistent infection, the knowledge necessary to determine the duration of treatment must rest on clinical experience. As the result of observations by a large number of investigators, information is now available that will guide therapy in the majority of cases. As the methods of administration and the optimum daily dosage of the drugs in a variety of disorders become clarified, relapses will diminish in frequency; nevertheless, there are factors in each case which resist therapeutic standardization. The principal obstacle is the variation in the sensitivity of the organisms not only in the same epidemic but in the same patient from day to day and week to week. Some workers believe this is due to the rapid disappearance of the drug-sensitive organisms and to a numerical increase in the members of the bacterial colonies which were originally resistant. In respect to penicillin, one is confronted with additional possibilities to explain the occasional lack of therapeutic response. Subcurative doses may result from the variable rate at which the drug disappears from the blood and from the variation in effectiveness of the natural species of penicillin; moreover, the possibility of the development and dissemination of resistant organisms by the use of prophy-

lactic sulfonamide compounds, penicillin and sulfonamide nose drops, penicillin troches, gum-containing sulfonamide compounds and penicillin aerosol may increase the difficulties that arise in attempting to eradicate infections. More experience is necessary for a complete understanding of the full significance of all factors responsible for relapses.

Hutchinson[17] states that American otolaryngologists have had the advantage of larger available supplies of penicillin and far greater opportunities to try it out than has fallen to the lot of their colleagues in Britain. He has abstracted the main points in many publications and presents them in coordinated sequence. Only a few of these can be mentioned.

Penicillin is extremely hygroscopic and is highly water-soluble. It is relatively unstable and it is easily destroyed by dilute acid. It rapidly loses its activity if exposed to the air but retains it for 24 hours if kept absolutely dry. It penetrates the tissues freely and is not irritating to the mucous membrane. Its action is not impaired by the presence of serum, pus, blood, of the products of tissue autolysis, while the number of organisms present have little effect on its periostatic action.

It appears to have a primary inhibitory effect on the reproduction of organisms sensitive to it by inhibiting fission while the body defenses actually destroy the organism.

Both the sodium and calcium salts of penicillin are used. The calcium salt is the more satisfactory as it appears to be more stable and less toxic than the sodium salt and may be handled more easily while it may be kept for long periods without any sort of activity. It is suitable for local, intravenous, intramuscular and intrathecal administration.

One of the essentials is to restrict the use of penicillin to infections due to susceptible pathogens. Most Gram-positives and Vincent organisms are penicillin-sensitive. Its use should not be attempted for Gram-negatives.

In staphylococcus aureus infections, results are satisfactory if the lesions are superficial, the infection localized, if

adequate drainage is initiated and the disease is relatively acute. In cases, however, in which the disease is chronic, drainage is incomplete and sequestra or foreign bodies exist, the result is unsatisfactory.

In streptococcal infections, there is uniformly satisfactory response.

In pneumonococcal infections, the response to penicillin therapy has been satisfactory in Type A and Type II infections.

It should be borne in mind, however, that even among usually susceptible pathogens certain strains are resistant; therefore, except in an emergency both bacteriological and sensitivity tests must be employed before embarking on its use, which should be carefully planned, insuring the effect.

As regards virus infections, there is as yet little to report.

Very few toxic effects follow its clinical use, whatever the method of administration, and irrespective of which salt is employed. Brief headache and dizziness may occur.

The amount of active penicillin in the blood can be measured by the power of the blood serum to effect bacteriostasis. When penicillin is introduced into the cerebrospinal fluid, it remains there for at least 24 hours and disappears within 48 hours. Penicillin not only fails to reach the cerebrospinal fluid in detectable amounts when given intravenously but also fails to do so when administered intramuscularly; therefore, in the treatment of infections involving the cerebrospinal structures, it should be given intrathecally at least once daily. With appropriate dosage by continuous intravenous drip, the amount of penicillin in the blood stream is 0.12 Oxford unit per cc.

With intramuscular administration of 25 units, three hourly around the clock, the blood penicillin content is not more than one unit per cc. one hour after injection. Some writers claim that even this level, which is definitely below that required to inhibit certain strains of staphylococcus aureus, third. Penicillin may be administered intravenously, intra-

is not reached; moreover, the blood content drops rapidly during the second hour and the drug is not recoverable in the muscularly by local applications, intrathecally and subcutaneously.

In a summary of the results obtained, he discusses its use in cavernous sinus thrombosis, peritonsillar and lateral pharyngeal abscesses and acute ulcerative pharyngitis, osteomyelitis of the facial bone, suppurative sinusitis and in orbital cellulitis.

A fair summary appears to be that the golden age has not yet come. Penicillin has by no means ousted and is not likely to oust surgery from the province of otorhinolaryngology. It tends, on the other hand, to increase considerably the scope of such surgery and when used along carefully planned lines to suit individual cases is a most useful ancillary to appropriate surgical measures. Indeed, it renders the prognosis in certain hitherto hopeless conditions, for example, cavernous sinus thrombosis, so much more hopeful that he confidently looks forward to a material reduction to their mortality rate.

De Blois,[18] believing that penicillin should be effective in the nose because of the anatomic structure and the accessibility of its surfaces for local application, reports a study of penicillin as an antibacterial agent. From the culture series reported it would seem that penicillin is not an effective bactericidal agent when topically applied in the ear, nose and throat. In only a small percentage of the cases studied did the areas treated become sterile, and in an even smaller percentage did they remain sterile for any appreciable time.

The rate of absorption of penicillin depends on the supply of circulatory channels, the route of administration, and the form in which the drug is administered. It is excreted rapidly following intravenous administration. Negligible amounts are detected in the blood stream after three to four hours. The period during which penicillin topically administered in the nose remains in the nasal cavity is short, owing to the rapid excretory action of the ciliated epithelium. This factor partly explains the failure of penicillin to sterilize

the respiratory tract; the drug is not left *in situ* long enough to have a beneficial action on the residual organisms. One of the best results obtained in the study was in a case of osteitis of the antrum in which the penicillin was administered directly into the antrum and remained trapped there for a longer period. Penicillin administered locally does not prevent the invasion of secondary organisms.

Krauss'[19] study of penicillin as used topically in the treatment of infections of the upper respiratory tract gave evidence that it is of definite value in the great majority of cases when it is administered in adequate doses and by the usual well established techniques. Used as nose drops alone, it is of doubtful value, although many individual patients were undoubtedly benefited by even this relatively ineffective method of administration. When topical administration is supplemented by parenteral administration, the clinical results are much more striking; this would seem to represent the method of choice.

McDermott[20] and his co-workers conclude, from administering partially purified sodium and calcium salts of penicillin to cats, dogs and human subjects, that absorption of ingested penicillin occurs chiefly from the duodenum. The amount of absorption which occurs from the stomach is not established, but is probably small. Inactivation of penicillin as a result of the acidity of the gastric content is seldom great. Absorption of penicillin is rapid. The maximum concentrations are attained in the blood within 30 to 60 minutes of ingestion. The subsequent persistence of penicillin in the blood is a reflection of the height of the maximum concentration originally attained and does not appear to be a result of continued absorption from the alimentary tract. Absorption of ingested penicillin is incomplete. Two-thirds or more of an orally administered dose is apparently not absorbed. Once penicillin has passed through the small intestine, only insignificant amounts are absorbed. The penicillin in the intestine which is not absorbed is inactivated by the bacteria in the colon, or, if an excess is present, it is excreted in the feces. The necessity for the use of larger amounts of peni-

cillin by the oral than by the intramuscular route is primarily the result of incomplete absorption and cannot be explained satisfactorily on the basis of destruction by acid or bacterial action.

Five commercial preparations of penicillin for oral administration were investigated by Meakins, Smith and Gold[21] to test the practicability of the tablets and to compare one preparation with the other. They report that, although the initial levels by the oral route are not nearly as high, therapeutic levels are reached and are maintained at least as well as one-half the dose administered intramuscularly. The one-half-hour readings showed that the penicillin was quickly absorbed and reached its peak within the half-hour. The levels fell quickly after the first hour, then more gradually until the end of the third, and then quickly again so that no penicillin was detectable at four hours.

From the gastric analyses done, it seems that in all the preparations the buffers used were effective, at least to a certain degree, in overcoming the influence of stomach acidity.

They concluded that the levels reached with oral administration was adequate for the treatment of many human infections.

In view of the occasional low values obtained with some of the products, it is felt advisable to check blood levels in all patients to whom penicillin is being administered orally, lest inadequate initial therapy promotes penicillin resistance in the invading organism.

The *Journal of the American Medical Association*[22] describes the fate of beeswax in penicillin mixtures. It is removed from the tissues by phagocytosis. Twenty-four hours after the intramuscular injection of penicillin in beeswax and peanut oil, the particles of beeswax are separated by collections of polymorphonuclear cells, large mononuclear cells and foreign body giant cells. No muscle necrosis is associated with this reaction, the fibres merely being separated. Beeswax usually disappears by the thirtieth day. Very little fibroblastic

reaction occurs, and that disappears within several months. In human beings who died from various causes one or two months after receiving penicillin in beeswax and peanut oil, numerous sections of the muscle were necessary to find the site of injection and beeswax was not identified. At this time minute cysts, some partially collapsed, having thin fibrous walls, with scattered giant cells, are present.

Engelsher[22] writes to the *Journal of the American Medical Association* that, having read a laudatory article in the journal, Sept. 22, 1945, extolling aerosol penicillin in sinusitis and asthma, he studied this procedure in 74 cases of bronchial asthma. Ages varied from five to 71 years, the sexes being represented about equally. The patients included physicians, nurses, teachers, housewives, butchers, laborers and school children. He chose a type which he classifies as asthmaticus persistans, variously referred to as "intrinsic or bacterial asthma," the intractable variety.

Treatments were conducted in the patients' homes under instructions from trained technicians for two to four weeks, using an oxygen tank to nebulize 20,000 units of penicillin through an attached atomizer every three to four hours.

The results were strikingly disappointing and almost with complete variance with the above mentioned report. A number of patients grew worse as the result of irritation from the penicillin. Some developed dermatitis and were unable to continue after two weeks' therapy. Those that did continue for the full period of four weeks were divided into two groups: 15 per cent who thought they may have been improved slightly, and 85 per cent who were definitely not benefited. As compared with the regular procedure in bacterial allergy, such as iodides, bronchodilators, sedatives, vaccine therapy and general care, aerosol penicillin in its present status makes a comparatively poor showing. Incidentally, oral and parenteral penicillin therapy in total doses of 500,000 to 1,000,000 units was without value in many of the cases of the asthmaticus persistans type.

His conclusion, therefore, at this time is that aerosol peni-

cillin (also oral and parenteral penicillin) is of questionable value in a small percentage and of no value in the majority of cases of bacterial asthma and sinusitis.

The *Journal of the American Medical Association*[24] replies to a question that there is no evidence that penicillin prevents the common cold, nor is there any evidence that it shortens the course. It would be difficult, therefore, to understand how a "penicillin breathing room" could be useful in the treatment of the common cold.

IRRADIATION.

Proctor[25] states that infection in the nasopharyngeal lymphoid tissue commonly plays a uniquely important rôle in the causation of the common cold, deafness due to malfunctioning Eustachian tubes, recurring or acute infection of the ear, bronchial asthma (especially in children) and chronic bronchitis. This is partly due to the anatomic location of such tissue, but a great deal about its etiologic rôle is as yet only poorly understood.

In many patients irradiation of nasopharyngeal lymphoid tissue is essential for its adequate elimination. Surgical removal of adenoids is at best not perfect, and even if all the nasopharyngeal lymphoid tissue could be removed, that within the orifice of the Eustachian tube would not be affected. Lymphoid tissue is an integral part of the mucous membrane in this region and is bound to recur as the mucous membrane grows back. Lymphoid tissue is so sensitive to irradiation that minute dosages will cause its regression and eventual disappearance without damage to surrounding tissues.

Irradiation is performed by placing a radium-containing applicator in the nasopharynx so that the middle (not the end) of the radium-containing chamber should be in direct contact with the tissue in the fossa of Rosenmüller or the orifice of the Eustachian tube.

Practically all the beta rays emitted by this applicator are absorbed by the tissues of the nasopharynx. About 75 per

cent of the beta rays are absorbed in the first 3 mm. of tissue, but 6 to 7 per cent of the hard beta rays are still detectable after passing through 20 mm. of tissue. In contrast, less than 10 per cent of the gamma rays are absorbed. The effects aimed at and obtained by radiation therapy are entirely dependent on ray absorption, and are roughly proportional to the amount of absorption. Rays that pass through the body and are not absorbed have no therapeutic effect.

The therapeutic effect of a single dose may be modified greatly by the reparative powers of the tissues. A unit dose given at one sitting produces more effect than the same total dose given in daily fractions in a period of a week. After moderate irradiation the nasopharyngeal lymphoid tissues recover in a period that varies from three to four weeks; therefore, the interval between treatments has been fixed at 25 days.

The size of the nasopharynx and the state of the lymphoid tissue vary, and the effects of treatment are not the same in every case. One is treating not deafness or aero-otitis but conditions in the nasopharynx that favor the development of these maladies. The aim of the treatment is to remove mechanical obstructions in the Eustachian tubes and the chronic infection in adjacent lymphoid tissue which causes hyperplasia, excessive secretion of mucus and edema of the mucous membrane.

The dosage that has been found most effective with this applicator is "1 gm. 20 seconds" on each side of the nasopharynx — since this applicator contains only 50 mg. or one-twentieth of a gram, the dosage is 20 times as long — 400 seconds, or six minutes and 40 seconds, on each side.

Should the applicator contain an appreciably smaller or greater amount of radium (1 to 2 mg. either way will make no difference), the time it is left in the nasopharynx will have to be increased or decreased to approximately the desired dosage of "1 gm. 20 seconds." For example, if the applicator contains only 40 mg. of radium, the strength will be only one-

twenty-fifth of a gram and the time should be increased to 500 seconds, or eight minutes and 20 seconds.

Work being done at present indicates that radium applicator dosage may be considerably increased. It seems now that a dosage of "1 gm. 23 seconds" is perfectly safe and that a dosage of "1 gm. 25 seconds" is probably safe; it may be that eventually a dosage of "1 gm. 30 seconds" may be used.

He believes it would be a tragic mistake for anyone to assume that irradiation in itself is the answer to any problem in otolaryngology. It cannot be overstressed that if any benefit is to be derived from radiation therapy this therapy must be intelligently used in connection with those other forms of treatment which have proved to be of benefit in the past. The advantages of radiation lie in: *1.* the simplicity and the safety of its use, and *2.* the fact that lymphoid tissue which cannot be successfully attacked by surgical measures alone may be eliminated by irradiation.

Boies[26] states that after removal of the tonsils and adenoids of the young child, lymphoid tissue has been observed to become prominent on the pharyngeal wall as "granules" and later as bands. While it is possible that this reaction is compensatory in that this new distribution may be an attempt on the part of nature to replace at least in part that which was surgically removed, there are many other possible causes of pharyngeal lymphoid hyperplasia, such as local infection, mouth breathing, bathing of the pharynx in secretions from the sinuses or from the respiratory tract below, endocrine disorders, metabolic disturbances and dietary errors.

His article is concerned chiefly with his own observations on the treatment by irradiation of children exhibiting early hearing loss. It is mentioned in this resumé because it affords a well considered survey of the literature concerning reduction of pharyngeal lymphoid tissue by irradiation.

Crowe[27] presents, as The Wherry Memorial Lecture before the American Academy of Ophthalmology and Otolaryngology, a long, exhaustive article on irradiation of the naso-

pharynx which should be read in its entirety. He emphasizes the great value of irradiation in otolaryngology, if intelligently and carefully used, because it inactivates and removes offending lymphoid tissue inaccessible to ordinary surgical measures. It is effective, safe, painless, inexpensive, and has proved particularly valuable for prevention of certain ear, sinus and bronchial conditions in children.

Radium has been so much used in the attempt to eliminate hyperplastic lymphoid tissue in the nasopharynx in children that it is useful to watch for evidence that it is a safe therapeutic measure.

Hendricks, Earl and others[28] studied the effects on flying personnel in the European and Mediterranean theaters of operation. Of the 6,881 patients selected for treatment, 1,129 were available for observation. Some of their conclusions were that the use of the nasopharyngeal radium applicator is a safe, practical and effective method of irradiating hyperplastic lymphoid tissue in the nasopharynx and irradiation of the nasopharynx causes a regression of lymphoid tissue.

Some years ago, when Ornston[29] expressed his envy of anyone who had a laboratory in which the fascinating study of cilia could be investigated, he received the retort, "All you need in order to study cilia is a patient and some lampblack!" Procuring both, he began to study.

The story of how he proceeded, of his reflections upon his observations and what it led to, forms an article of a most unusual type and should be read by every young rhinologist who possesses an inquisitive mind.

Lampblack and other agents were eventually discarded in favor of Micraform crystals of sulfathiazole used dry in a powder blower. After the common nasal meatus has been opened to inspection, a quick burst of sulfathiazole crystals, with the nozzle directed towards the septum and traversing an arc from the bridge to the floor of the nose, will be found to have covered most of the visible surface with a frosting of white. Any area not reached may be sprayed again. The ensuing streaming may be followed readily with the eye.

There is no esthetic objection to the use of these crystals on the part of the patient, but he should be asked about the possibility of allergy to them. He has found such a condition to be extremely infrequent.

No rhinologist can fail to thrill at the opportunity to observe for himself the divers patterns in different noses. In a normal nose, as one watches, the crystals will be seen to rapidly coalesce into small flecks. They are gathered together to small streams which merge to flow purposefully towards the nasopharynx. What may happen, the author describes at length.

All this is beautiful to watch and, like any of nature's marvels, must be seen to be appreciated; "but," says the busy rhinologist, "what of it?"

The normal must be observed, and repeatedly, before the abnormal can be appreciated and the extent of its deviation appraised. The more often one watches the action of these crystals on mucous membranes, the more one can learn from it. In some doubtful cases their action is diagnostic.

He mentions examples of these and gives his conclusions. The reader must consult the original article for these. The conclusions, he admits, are inferences only. He realizes that they sound radical as compared with teachings in the past. He requests only that, before they are condemned, the doubter take the trouble to test this method for himself and to observe, painstakingly, by every route, as much as he can see of the inside of the nose and the nasopharynx; he can be assured of an enjoyable study.

Nasal surgery has a bad reputation. It has earned this because the practices of a previous generation are known to be contrary to our present knowledge of the nasal physiological processes.

Proetz,[30] in an admirable essay on the maintenance and repair of the nasal mechanism, briefly but adequately presents the principles of nasal physiology and its practical application. The article should be read in its entirety by every

general practitioner and by every rhinologist. It is impracticable to completely abstract this article, but a few of his statements and conclusions are now given.

Until a very few years ago, "ventilation and drainage" was the watchword of our foremost teachers. But modern methods are based upon the understanding that it is useless to attempt to establish ventilation and drainage at the expense of the other nasal functions. Patients sooner or later discovered that their pus and obstruction had been removed at the expense of their nasal function and that now they have new and probably irreparable symptoms in the shape of headaches, dry throats, neuralgias and a susceptibility to laryngitis and tracheitis; and, further, that the symptoms increase with age.

We know now that an infected sinus cannot be regarded as an abscess.

The management of troublesome and persistent nasal obstruction now concerns itself with function and not mere structures, a practice long prevalent in dealing with many other organs.

The mucosa of the nose and the accessory nasal sinuses is ciliated throughout (with the exception of small areas in the preturbinal and olfactory regions). The cilia are primitive structures and, therefore, rugged. They cease beating only when the epithelial cell itself is destroyed; they may beat as long as two to three days after death. Few of the solutions commonly used in the nose have any serious or permanent effect upon them. Cocaine and adrenalin are the exceptions. Contrary to our earlier teaching, the cilia can and do persist in infected sinuses in areas where the epithelium itself is not destroyed. If the epithelium is denuded of its surface layers, regeneration with function takes place in a matter of hours.

Complete regeneration of the mucosa with functioning cilia has been shown to take place in the uninfected sinuses of a dog after stripping to the bone.

He mentions several other new fundamental facts and from

them all lays down a few principles of treatment which are much more effective than the former abscess-draining routine.

In respect to heating and humidity, it will be well to observe those structures which participate in maintaining them. While certain structures may have to be sacrificed in given cases to obtain results, this should be regarded somewhat in the light of an amputation and should be confined to offending parts.

Sinuses frequently require opening to rid them of infection, but the opening should be relatively small and so placed that it does not admit the blast of dry, inspired air with which the sparsely supplied glands inside the sinus cannot cope and which will result in a metaplasia of the mucous membrane with its sticky secretions, its crusting and its pain.

Since all ciliary streaming in the sinus is toward and through the ostium, this should be regarded as a functioning organ, without which the sinus cannot properly empty itself and should be avoided wherever possible. This particularly applies to the sphenoid and the maxillary sinuses. The success of the commonly used antrum window is an example. As ordinarily made, it lies away from the ostium and is itself protected from incoming air by the inferior turbinate.

Although most of the vasoconstrictors do not directly affect the ciliary beat in concentrations usually employed, they do have the effect of increasing the capacity of the airways and decreasing the blood supply through vasoconstriction. If these astringents are carried to extremes, either in point of concentration or of frequency of application, the mucus is decreased in amount and in fluidity. The resulting sticky coat is incapable of being propelled by the cilia. Although these may continue in motion, stasis, nevertheless, occurs with its attendant disadvantages.

Nasal irrigations are not always out of place. In a given case, there may be no cilia to protect, the surface may be dry and irrigation may be indicated. But if this becomes habitual, the conditions for regeneration of the mucosa are not met.

The indiscriminate use of vasoconstrictors by the patient

is to be condemned and it is his practice to write a "no refill" order on each prescription, sometimes a date after which the solution is not to be used. Often a patient can be broken of his vasoconstrictor habit by prescribing ephedrine by mouth to replace it, then promptly reducing and withdrawing this also.

Ostia may sometimes be freed of obstructing ropy masses of mucus by applying a slim suction tube directly to the exudate. Massive suction applied to the nose in general via the nostril is condemned as being mechanically illogical, ineffective and essentially dangerous.

His brief discussion of the nasal physiology and its therapeutic implications indicate the importance of a thorough understanding of the nose and its workings if anything other than a haphazard result is to be expected.

The whole of the upper air passage is lined with a thin but tenacious coat of mucus which is kept in constant motion from nostril to pharynx by the cilia. Proetz[31] states that for infection to take place something must occur which permits the invading organism to remain in contact with an individual cell long enough to permit penetration.

He discusses four such agencies: *1.* structural mechanical obstruction; *2.* drying; *3.* functional mechanical obstruction; and *4.* biochemical stasis of the mucous blanket.

Whether all the details of his presentation are correct is of less importance, he states, than: *1.* that colds arise in different ways; *2.* that they are apt to repeat a pattern in a given individual, affording us an opportunity of anticipating them; *3.* that in many instances the prodromal signs indicate means of preventing the attack; and *4.* that an investigation of the means by which cilia and their mucus blanket are incapacitated is likely to open the way to more effective prevention of epidemic colds.

Fabricant[32] notes that attention has been directed by a number of investigators to a relationship between emotional factors, the frequency of acute colds and their sequelae and

altered nasal function. Just as emotional changes can cause vasomotor changes in the nasal mucous membrane, so they can produce transient conversions of nasal secretion from a normal, slightly acid to an abnormal, alkaline state. These variations, like vasomotor changes, will not take place within the confines of every nose. It is only in susceptible human noses that there will be demonstrable responses to anxiety, fear, worry and fright.

So far as concerns the pH values of local medicaments, valid therapeutic conclusions have been drawn in a variety of clinical fields from measurements of the hydrogen ion levels of various secretions found in their original positions on underlying mucous membrane and tissue surfaces. Similar acknowledged and accepted premises have been advanced with regard to nasal medication. Intranasal treatment by means of rational, physiologic nasal medication requires not only treatment of mucous membrane surfaces (including ciliary action) but treatment of nasal secretion (including the mucous blanket) as well.

Normal nasal secretion (including the mucous blanket) possesses a purposeful acid barrier against infection. It has been established that acidity as reflected in low pH values is unfavorable to the growth of pathogenic bacteria and that nasal secretion possesses an acid composition when receding after allergic attacks. The two phenomena point in corroboration to the significance of normal, slightly acid nasal secretion *in situ*.

PHARMACOLOGY.

In an editorial, the *Journal of the American Medical Association*[33] states that recently newspaper and radio publicity has been given to a report of use in the treatment of 42 patients with "hyperesthetic rhinitis" of a new drug, "Anthallan." Anthallan is a benzofuran derivative; other information on its chemical or pharmacologic properties has apparently not been published; it is said to be marketed by the Medico Chemical Corporation, of New York City.

The author of the report claims to have coined the term "hyperesthetic rhinitis" to cover cases of rhinitis in which there is an element of "hypersensitivity of the nasal mucosa," symptoms of excessive nasal discharge, excess sneezing and nasal obstruction. It is difficult to perceive wherein these cases differ from those which have heretofore been grouped under the term "vasomotor rhinitis" or "hay fever." Certainly it is unwise to introduce a new term into a field already distinguished by a multitude of ill defined conditions to which a confusing variety of names has been assigned.

Appraisal of the effectiveness of anthallan from the treatment of the 42 patients who form the clinical material of this report is difficult. The results are obscured by a complicated system of assigning numerical values to the symptoms of the patient, then averaging these and comparing these averages with those derived from similar numerical values assigned at the end of treatment. The differences are expressed in percentage of improvement. The elements which were assessed by this statistical process were the patient's statement about his symptoms, the color of the mucous membrane, the amount of breathing space and the amount of visible secretion in the nose. In a masterly understatement the author admits that "numerical evaluation does not always express the whole clinical impression of the patient's condition . . ." Therefore, he assigns similar numerical values to a diagnostic criterion termed a "medical estimate."

This attempt to measure accurately factors which are not measurable is absurd. The result of the statistical manipulations described is to make impossible any scientific appraisal of the effects, if any, produced by the drug. The statement is made that "every change in the nasal manifestations observed during the period of treatment with anthallan can be attributed to the influence of the drug." The only justification for this statement appears to be that "the anthallan treatment period was considerably shorter than the period during which the manifestations had existed."

The laboratory studies reported included observations on red blood cell counts, white blood cell and differential counts,

blood glucose, blood nonprotein nitrogen, electrocardiogram and nasal smear eosinophils. Significant changes in these well recognized factors were not observed.

Notably lacking in this report are parallel studies on control patients, or, in fact, any controls whatsoever. There does not seem to be any basis in the author's results for the recent newspaper and radio publicity given anthallan as a new "cure" for hay fever. Until more convincing and scientifically controlled investigations are reported, the decision regarding the efficacy and value of anthallan must be deferred.

Thacker,[34] in searching for the ideal drug which will alleviate the uncomfortableness of the nasal congestion associated with vasomotor and allergic rhinitis until the causative factors can be eliminated or permanently controlled by other measures, contributes a study of the action of benadryl in these conditions.

Benadryl was chosen because it is an antihistaminic substance. The present concept of allergy is that allergens produce on sensitized cells an effect causing liberation of histamine or of a histamine-like substance which initiates the symptoms recognized as allergic manifestations. Consequently, it is rational to work on the hypothesis that the administration of antihistaminic substances should have a beneficial effect in relieving the symptoms associated with the hypersensitivity.

Benadryl was given to 72 patients whose complaints embraced vasomotor rhinitis, definite perennial allergic rhinitis and nasal allergy associated with asthma. Marked improvement or complete relief from nasal congestion and its associated symptoms occurred in 50 per cent of the group with vasomotor rhinitis and in 42.8 per cent of the group with perennial allergic rhinitis. Only four of the eight patients with associated asthma were definitely improved, with none of these obtaining complete subsidence of the thoracic symptoms and physical findings. One patient with pseudo-Ménière's syndrome obtained complete relief; another was not helped. Of the whole group, 25 per cent obtained complete

relief while taking benadryl, and 20.8 per cent were definitely improved. Only very slight or no improvement was recorded for 54.1 per cent.

Benadryl may be added to the list of drugs to be used in controlling temporarily vasomotor and perennial allergic rhinitis until the patients can be thoroughly studied and sound therapeutic procedures instituted to control permanently the vasomotor and allergic phenomena. The drug should not be given for a few days preceding cutaneous testing for allergy, because the effect may interfere with the wheal and pseudopodia formation in response to the allergens used. From this investigation it is concluded that a physician cannot expect more than one-half of the people suffering from vasomotor and perennial allergic rhinitis to be benefited by the use of benadryl. There is no evidence at present that withdrawal of this antihistaminic drug after prolonged administration will demonstrate a patient permanently relieved of his nasal and associated symptoms. Benadryl is certainly not the answer to the physician's prayer for a solution of the allergic problems which face him and his patients; however, it is another step forward in controlling that part of the vasomotor and allergic equation associated with liberated histamine.

Goodhill[35] provides a preliminary report detailing experiences in the symptomatic treatment of allergic rhinitis orally with pyribenzamine, a new antihistaminic drug.

Pyribenzamine has been given orally in 50 mgm. tablets to 120 patients with either acute or chronic allergic rhinitis. The diagnosis of allergy was confirmed by a careful history and physical examination; many of these patients were also studied by cutaneous tests and elimination diets. Where indicated, cytologic studies were made.

He gives five illustrative case reports; one of these, a child of six who had severe allergic rhinitis for three years. Attempts at specific desensitization by a competent allergist were unsuccessful. Within the previous six months none of the oral preparations helped her. Benadryl made her too sleepy (almost to the point of coma) to be of value. After

being placed on pyribenzamine 25 mgm. t.i.d., she had almost complete relief of her sneezing and nocturnal nasal obstruction without sedation or other demonstrable side effects.

He finds the new agent an especially valuable drug for the relief of sneezing and itching of the nose and throat, as well as an efficient nasal decongestant in nasal allergy.

Boyd, Copeland and Lapp[36] state that a drawback to the use of certain drugs, such as inhalers containing amphetamine, in the local therapy of nasal congestion, allergic rhinitis, catarrhal rhinitis and allied conditions is the cerebral excitement which they produce when used in excessive doses. In recent years, tuamine (2.aminoheptane) has been introduced as a volatile decongestive agent which may be used in the form of an inhaler. Experiments were performed on approximately 2,000 animals in an effort to ascertain whether tuamine has similar excitant properties. From the evidence produced, they conclude that tuamine in therapeutic doses, and even in doses somewhat above the therapeutic level, has little or no excitant effect on the central nervous system.

The *Journal of the American Medical Association*[37] states in an editorial that recent reports concerning the value of streptomycin in the treatment of influenzal meningitis and urinary infections have created widespread demand for this antibiotic preparation.

Unfortunately, streptomycin, or perhaps the impurities now present in many commercial preparations, have toxic potentialities. Two fatalities from histamine-like reactions are known to have occurred. VIIIth nerve damage has been reported and delayed fatty infiltration of the kidneys has been observed in animals following the administration of streptomycin. Not all batches of this drug produce these reactions; however, only extensive and well controlled laboratory examinations of each batch can separate the harmful from the safe lots.

The editorial points out that at the time of writing legislation providing for the certification of each batch by the

Food and Drug Administration before interstate distribution had not yet been enacted with respect to streptomycin.

Callomon[38] believes that clinical trial of new drugs recommended for nasal use should be postponed until adequate laboratory and animal experimentation justify their use. He, therefore, studied the local effects of seven sulfonamide compounds of various pH values on the nasal mucosa of mice. The experiments were performed with elaborate care so that the macroscopic and microscopic observations would be of value.

The pathologic changes observed in the nasal tissues consisted of: *a.* slight to considerable inflammation of the mucous membrane; *b.* focal or extensive disorganization or destruction of the olfactory epithelium, with or without excess of the mucus covering its surface, sometimes associated with focal damage of the ciliary part of the mucosa; *c.* small or considerable amounts of purulent exudate in the nasal cavities, sometimes in the sinuses also.

In varying degree, tissue changes were found during treatment with all the solutions of sulfonamide compounds; however, also in varying degree, return to normal was observed in tissue specimens taken on the fifth day after the last treatment. His observations indicated that there were marked differences in degree in the injury produced by the various solutions. The solution showing the least irritating effect was 3 per cent sulfathiazole in propylene glycol with a pH value near the normal physiologic range of nasal secretions in man.

His paper, which deserves close study in its entirety, is a contribution to the therapeutic problem of developing a nontoxic medication, compatible with ciliary action, of the same hydrogen ion concentration as the nasal tissue and, therefore, nontraumatizing to the mucous membrane.

ANATOMICAL PECULIARITIES.

Durward, Lord and Polson,[39] in reporting one case of bilateral choanal atresia in an infant and one case of unilateral

choanal atresia in an adult, review the subject completely and follow it with seven double pages of bibliography.

The original reports of 262 cases have been examined and verified, and for statistical purposes another 30 cases, of which there are adequate abstracts or citations by two or more independent authors, are also included. Another 98 cases were seen, but, although the information left a doubt that they were authentic examples, the details were inadequate for analysis. There was scanty information, insufficient to confirm the diagnosis, of another 34 cases. Their search yielded some 390 authentic cases, and, allowing for omissions and doubtful cases, it is unlikely that over 500 have yet been described. The condition is, therefore, rare.

Bilateral atresia usually causes serious effects. Patients in whom bilateral atresia is a chance finding are indeed exceptional.

In 1926, Hart described a woman of 21 in whom nasal atresia was found during a routine clinical examination. She had sought advice for eye trouble and except that she had the facies of a mouth-breather, she had no nasal symptoms.

The newborn infant has to acquire the mechanism of mouth-breathing and, therefore, bilateral choanal atresia may cause urgent symptoms and result in death from asphyxia. The case records demonstrate that there are two principal groups; namely, patients with cyclical asphyxia, the symptoms of which are especially urgent, and those who have asphyxia during suckling. Although the latter are in less immediate danger, failure promptly to recognize and treat the cause may result in their death from starvation.

In patients of the first group, respiratory obstruction is apparent at birth. The cheeks and lower lips are indrawn and there are symptoms of asphyxia, promptly relieved when the child opens its mouth to cry. Steps must be taken to keep the infant's mouth open and it is useful to draw the tongue forward. While the airway is maintained, respiration will be free and the child will breathe strongly and have a lusty cry.

Much translucent mucus of glue-like consistency is found in the nasal fossae but its removal fails to establish an airway. Examination with a probe will demonstrate obstruction at the back of each side of the nose. A quiescent period is followed by one of asphyxia, promptly relieved by opening the mouth, but the cycle is repeated when the mouth closes.

In the second group of patients, asphyxia at birth may be negligible, but is apparent as soon as the child attempts to suckle. They may snore or breathe heavily during sleep, but urgent symptoms ensue only when mouth and nose are closed during suckling. These patients if untreated may survive a few weeks or months, but if untreated will then die from starvation. The records of patients who have survived tell of a stormy infancy, characterized by difficulty in suckling and in some cases also by frequent attacks of suffocation during sleep. Although these patients cause less anxiety than those with cyclical asphyxia, deterioration may be rapid and call for urgent treatment.

It is exceptional for patients to belong to neither of these two groups.

Unilateral atresia in the infant may, at times, simulate the bilateral type, especially if nursed at the breast with the patent side against the mother. It is likely, also, that nasal obstruction in these infants may become almost complete if they catch cold. There may be difficulty in suckling, but no instance of cyclical asphyxia is traced. Most of the patients, however, were without symptoms until of an age to appreciate the discomfort occasioned by unilateral atresia. Even then, several regarded this as no more than a nuisance. Most came under observation after, rather than before, 10 years of age, but the majority sought advice by the time they were 30. While some had not perceived the existence of nasal obstruction, it was more usual for the patients to say that unlateral obstruction had existed for as long as they could remember.

The diagnosis of choanal atresia, as judged by some of the case reports, might seem difficult because not a few patients

had been subjected to one or more nasal operations before the real trouble was discovered. There is little doubt, as judged by the majority of reports, that the real difficulty in diagnosis is forgetfulness or ignorance of the condition.

If an infant, observation of the patient in its cot is of first importance and will readily detect cyclical asphyxia. A careful history and observation of the child during suckling will detect the second group of patients. Confirmation of the diagnosis is most readily obtained by probe examination, especially if the curved probe is used. In addition to resistance offered by the partition, there is failure to pass the probe behind the soft palate into the oral pharynx.

The prognosis of choanal atresia is determined by the grade and also more directly by the time taken to recognize and treat the condition. Bilateral atresia, whether complete or incomplete, is generally associated with urgent symptoms, shortly after birth. The records do not confirm the gloomy outlook that complete bilateral atresia is incompatible with life and recovery from incomplete atresia a rare event. The records show that this is incorrect. Survival, even into adult life, is possible in the absence of any treatment but it will be found that most of the patients have had a stormy infancy and, in general, early treatment is imperative.

Unilateral atresia, as might be expected, is rarely associated with urgent symptoms and the records of only two fatal cases are found.

Operative treatment almost always gives immediate relief. The simple opening of the choanae may effect complete cure, but reclosure by scar tissue is to be expected unless more radical measures, notably the removal of part of the vomer with the partition, are practiced.

The treatment of choanal atresia depends, primarily, on the age of the patient, and whether the obstruction is bilateral or unilateral. The latter, in an infant, is likely to escape notice until later in life, but the former presents a different, more serious, and at times an urgent problem. The choice

of method with these infants lies between an immediate attempt to make a nasal airway or the establishment of mouth-breathing and the maintenance of nutrition, operative measures then being deferred until a later date. Opinion is not uniform, but the authors believe that immediate operation is the better course. If it be decided to temporize, serious difficulty may be experienced in maintaining an efficient oral airway until mouth-breathing is acquired. Either relays of nurses, constantly in attendance for several days, would be required or, alternatively, an infallible gag has to be devised. Failure to maintain the oral airway, even for short periods, may prove fatal.

Operative treatment has two objects; namely, the formation of a nasal airway by destroying the partition and, less easy to effect, the prevention of reclosure by granulation tissue. The latter is not infrequent, and its prevention has proved a problem to which several solutions have been proposed. In the main, these are variants of three principal methods; namely, *a*. the insertion of tubes or sounds in the opening, or *b*. the provision of a mucosal covering for the raw edges of the artificial choana, or *c*. the removal of the partition and a portion of the nasal septum.

The case lived three months. Bilateral membranous choanal atresia was found at autopsy. Secretion retained on account of choanal atresia became infected and the infection spread to the right antrum and orbit with a final phase of pyemia producing abscess in the lung and suppurative pericarditis.

Weaver[40] reports the case histories of four children with congenital preauricular sinuses and provides photographs. The method of treatment was as follows: under avertin and novocaine infiltration anesthesia, methylene blue was injected into the sinus tract. The main tract was then exposed by incision and after this and some of the larger ramifications were dissected out, the entire area, including all of the epithelial ramifications, thoroughly electrocoagulated.

Howie[41] records identical deformities in the nasal septa

of a pair of identical twins. At the time of writing, the latter, now aged 22, were serving with the Royal Air Force.

"The deformity in the nasal septa of the identical twins described in this paper is congenital and may well be hereditary. Study of the septa of a series of monozygotic as well as dizygotic twins, and the investigation of pedigrees are, however, necessary before a theory can be formulated; but I hope that the recording of this case may suggest a line of inquiry which would give a definite answer to the vexed question of the causes of septal deviation.

"If such a developmental abnormality can be genetically determined, then a proportion of cases of septal deformity may be the result of an inherited tendency."

Reid[42] reports almost identical septal deformities in a pair of identical twin boys, aged 13, referred because of recurrent severe epistaxis and both of whom had a similar congenital cardiac defect.

TONSILS AND ADENOIDS.

Reeves[43] maintains that the bleeding after an adenoidectomy should be as carefully stopped as the hemorrhage after a tonsillectomy, and describes the chief procedures which help produce a dry field after adenoidectomies.

The most frequent source of hemorrhage is the cut edge of the pharyngeal mucosa below the adenoid, where the bleeding is easily stopped by the modified Coakley's slipknot ligature. An excellent illustration of this modification is provided.

The second best method is the injection of adrenalin solution. In cases where a retronasal packing has to be used, it should be so placed that it exerts pressure on the bleeding surface.

Govan[44] reports a study of prothrombin activity in patients receiving therapeutic doses of salicylates for long periods.

The prothrombin deficiency attending the therapeutic ad-

ministration of salicylate compounds is apparently neither a constant nor a dangerous feature of this form of medication. When salicylate compounds produce a depression of the prothrombin activity, it is usually between the second and fifth day of administration of the drug and by the ninth day has usually returned to normal.

The mechanism by which salicylate compounds produce a hypoprothrombinemia is obscure. It is unlikely that the hypoprothrombinemia results from a direct action of the salicylates on the circulating prothrombin, for if such were the case the effect would be constant and dependent on the concentration of salicylates in the extracellular fluids. The observations in this study did not favor this view. It seems more likely that the depression of the prothrombin formation is a result of changes in the liver. It is well known that salicylates in very high concentrations can produce histologic changes in the livers of experimental animals. It would be anticipated, therefore, that similar lesions would occur in man and the degree of damage would be dependent on the concentration of salicylate in the body. Thus, if it can be assumed that the depression of prothrombin activity represents a form of liver damage, the effect of therapeutic concentrations of salicylates in the body upon the liver must be minimal. This is evidenced by the following: *1.* Prothrombin deficiency does not always follow the administration of salicylates; *2* when the prothrombin activity is depressed it spontaneously returns to normal; and *3.* hykinone or vitamin K will prevent a reduction of the prothrombin content.

There have been several reports of hemorrhagic complications arising during the administration of salicylates, and it is likely that hypoprothrombinemia constitutes one of the mechanisms by which this effect is produced. As has been pointed out, however. if the prothrombin activity is dependent on the amount of liver damage produced by the salicylates, it would be correct to assume that in individuals accidentally poisoned with salicylates the high concentrations would be more likely to produce hypoprothrombinemia and hemorrhages. It is in this type of patient that intensive vitamin K

therapy would be indicated; however, as Link and associates have pointed out, prothrombin deficiency alone does not explain the hemorrhages. It is likely, however, that vascular trauma and dilatation plus prothrombin deficiency play a part in some patients in the production of hemorrhages.

Cunning[45] states that attention has been focused in recent years on the relationship of tonsillectomy to poliomyelitis. A survey of the literature suggests that some relationship may exist. One cannot deny the numerous, tragic, acute infantile paralysis attacks following recent surgical removal of tonsils. Such evidence cannot be brushed aside as unimportant. He contributes a long search of statistics to determine whether the relationship is casual or coincidental.

He avers that the mode of transmission and the portal of entry of the virus of poliomyelitis remain unknown. Without this knowledge we are forced to theorize on the relationship between tonsillectomy and poliomyelitis. He continued the search commenced by Dr. John R. Page and found the study carried out at Manhattan Eye, Ear and Throat Hospital on 11,204 tonsillectomy patients over a seven-year period revealed but four cases of poliomyelitis following tonsillectomy. None were of the bulbar type.

He concludes, therefore, that the widespread alarm on the part of the public and shared by doctors in some communities is unfounded on the basis of his statistics.

Roberts[46] has collected figures on the incidence of poliomyelitis following tonsillectomy and comes to the following conclusions:

Two hundred seventy-four cases of poliomyelitis following recent tonsillectomy have been reported during the last 35 years. It is estimated that 70,000,000 tonsillectomies were done during this period. It is estimated that 75 per cent of this number, or 52,500,000, were done on patients under 18 years of age, the susceptible period. It is estimated that over half of these operations, approximately 24,000,000, were performed during the poliomyelitis months. If these 274 cases

of poliomyelitis had all occurred during the poliomyelitis months (which they did not), the incidence would be one case of poliomyelitis to approximately 100,000 recent tonsillectomies. It is estimated that the average annual incidence of poliomyelitis in everyday life is one to 3,250 of population. These figures show that the annual incidence of poliomyelitis in everyday life is 31 times greater than in the recently tonsillectomized population even during the poliomyelitis season.

ATROPHIC RHINITIS.

Reports on the therapeutic use of antireticular cytotoxic serum, delivered at the Academy of Sciences of the Ukranian S.S.R. in 1942, have presented a new agent for clinical use in many pathological difficulties, atrophic rhinitis being included.

Jackson[47] presents a well conducted study of the use of this agent on 24 cases ranging in age from 22 to 70 years, six below 30; 20 atrophic rhinitis (ozena), and four cases of atrophic nasopharyngitis.

In some of the patients with ozena, treated with this agent, there was some improvement; but there was no improvement in the larger percentage of cases. The cases showing improvement were judged mostly on subjective phenomena. No change was noted in the size of the atrophic structures.

Although no children were included in this study, it is felt that attention should be called to it because some readers might have been tempted to give this agent a trial.

SURGERY.

Kazanjian and Holmes[48] state that stenosis of the nasopharynx is fortunately a comparatively rare condition, as it is one which is difficult to overcome. A brief review of the literature is presented together with the various types of operations that have been advocated by different operators. Of their series of 16 cases of operations, in nine of them stenosis was caused by operations on the tonsils and adenoids.

In three of these the operation on the tonsils and adenoids was followed by infection of the tissues which sloughed, creating an extensive exposed area which granulated and resulted in a contracture.

The stenosis which follows some destructive infective process such as syphilis or tuberculosis is the most difficult type of stenosis to correct. This is due to the diffuse, avascular, dense scarring which does not tolerate operation, especially the creation of flaps, and on which grafting will not readily adhere.

The patients whose stenosis follows surgical trauma may anticipate a more promising end-result.

In this series of cases skin-grafting, pocket skin-grafting, excision and then insertion of an obturator were tried. It became evident to them that these methods were prone to disappointment except in cases which presented soft vascular tissues about and near to the stenosis. They experienced more satisfactory results when planned flaps were utilized. Some of these flaps may be made of the scar tissue that is covered with mucous membrane, but it became evident that in the cases with the most successful results a flap taken from the adjacent cheek was employed also.

Once the stenosis is overcome, one must expect narrowing of the opening on healing, but if the opening remains patent enough to permit the passage of adequate air and secretions so that the patient is symptom-free, one may consider the operation as successful.

The Nichols method of opening the nasopharynx is mentioned but not commented upon and was evidently not given a trial.

Weille[49] reviews 15 years' experience at the Massachusetts Eye and Ear Infirmary to obtain facts and figures instead of more or less isolated impressions regarding the problem of secondary frontal sinus surgery. Two hundred seventy-six patients had 862 operations, with a 15 per cent mortality.

This paper is a small monograph which should be carefully studied before any frontal sinus surgery is attempted, even if the subject be an older child. In this surgery there is almost no mention of the older child, but in this regard there are two points of interest.

To prove a point regarding bone regeneration, he shows a postoperative X-ray film of a 14-year-old girl who had osteomyelitis of the frontal bone excised with all walls of both frontal sinuses. She had previously had a left Lynch frontal. A second film taken two years later shows the bony defect to have regenerated and the frontal sinuses to have reformed.

He considers that tantalum is proving of great value in prosthesis because it is inert and is well tolerated by the body cells. The metal is both malleable and ductile, so that it may be rolled into sheets of any desired thickness. He has employed it as a tube permanently implanted with one end in the frontal sinus and the other in the nasal cavity, using tantalum sutures and molding the tube to fix it in place. He gives three illustrations of Roentgenograms of his patient.

When the patient, a nine-year-old white male, was first seen by the writer, his history was as follows: he had had left-sided, acute pansinusitis with orbital cellulitis. Decalcification of the outline of the left frontal sinus developed in spite of chemotherapy. A left external frontoethmoidectomy was done with complete removal of the anterior wall and floor of the left frontal sinus. The patient was well for six months, but then complained of severe pain in the left orbit, which was accompanied by swelling and tenderness of the forehead. The edema improved, but did not disappear with chemotherapy. X-ray films showed that the back wall of the frontal sinus high up was gone in two areas. Reobliteration was carried out with excision of the posterior wall. Because of a small perforation in the interfrontal septum, this structure was removed entirely. His convalescence was uneventful, and he remained well for about eight months, except for recurrent swelling of the forehead, with head colds.

Then, following swimming, he developed swelling, redness

and tenderness over both frontal regions. An abscess of the left frontal area was incised and drained. About seven weeks later, a tantalum tube was placed by the writer in the right frontal sinus at its posterior wall just lateral to the margin formerly occupied by the interfrontal septum; the tube was brought into the left nasal cavity, and was fixed by tantalum sutures. Convalescence was uneventful. The patient has been well during a follow-up of one and one-half years, despite several head colds.

NEW GROWTHS.

Sudden death is not a very common occurrence in infants who are apparently healthy or appear to be suffering from only some minor ailment. Asphyxia is among the more frequent of the conditions listed as possible causes of sudden death. This may result from the aspiration of food, mucus or foreign bodies, or from accidental mechanical suffocation.

Whittier and Dombrowsky[50] state that, although uncommon, a mucus retention cyst at the base of the tongue should also be considered in the differential diagnosis of asphyxia or difficulty in breathing. Whenever unexplained choking dyspnea or cyanosis occurs in an infant, a cyst of this nature should be ruled out by a careful visualization of the base of the tongue. The importance of this becomes more apparent when it is realized that this condition is readily amenable to treatment.

Cysts at the base of the tongue may originate either from incomplete obliteration of the lingual portion of the thyroglossal duct, or from mucous glands. The former are usually found in the midline beneath the foramen cecum. They are lined by stratified squamous or ciliated epithelium. Mucous or retention cysts occur when the mucous glands in this area become obstructed. Such cysts are usually located between the epiglottis and the foramen cecum and may be either in the midline or lateral to it.

The writers present a detailed case report illustrated by a good photograph of the postmortem specimen from a two-month-old baby in whom the diagnosis was missed. They

point out that since these cysts are usually near the midline, the ordinary large wooden tongue depressor may cover and flatten them, obscuring them from the examiner. A small infant-size tongue blade should therefore be used in this examination.

(The history gives a most valuable diagnostic sign which was neglected: "Mild inspiratory stridor was noted only at times when the baby was lying on his back. This would disappear when the baby was turned on to his abdomen." The location of the abnormality would have been discovered if an examiner had palpated the back of the baby's tongue. Direct examination with an infant laryngoscope would also have shown that the larynx could not be seen. Treatment consists in placing the baby on its back with mouth widely open and the tongue pulled forward with a tongue forceps. The cyst can then be readily seen. A suction tip is placed in the throat and the cyst punctured. The relief is immediate and the larynx becomes visible. A recurrence can be treated similarly. If the condition persists in returning, the cyst can be removed by dissection.)

McClure,[51] in a girl aged 12, at operation, discovered a large, bony, cellular tumor, in the left lateral pharyngeal space, about two inches long by one inch wide, apparently not attached to any bone. A deciduous tooth lay firmly embedded in the most lateral portion of the growth, firmly fixed in the bony cellular tissue, just below and internal to the tip of the mastoid process. The postoperative diagnosis was: embryonic bony tumor with a deciduous tooth, double rooted, embedded in an abnormal socket posterior and internal to the left posterior ramus of the mandible.

The pathologic diagnosis was: benign osteofibroma (dentigenous origin — tooth in malposition). A photomicrograph shows the specimen of tumor removed at the first operation.

Eight years later the patient experienced pain in the left ear with fullness, and a slightly movable lima-bean-sized mass was found in the left lateral pharyngeal space. A Roentgenogram is supplied showing a dense shadow resembling a dental structure in the posterior wall of the pharynx

on the left side in the region of the orifice of the Eustachian tube. This was removed by operation and the pathologic diagnosis was odontoma.

The recurrence of the tumor was definitely due to a small portion of the capsule in the extreme lateral part remaining, which contained tooth remnants in the bony structure, with the power of regrowth. This regrowth is typical of odontoma, with the second tooth presenting itself to the surface — in this case, the nasopharynx.

A useful summary of the literature on odontoma is given and after careful search he concludes that one in the nasopharynx has never before been adequately described. He is, therefore, the first to report an odontoma of the nasopharynx.

Roberts and Forman[52] briefly review the pathology of follicular odontoma which are ectodermal tumors arising from tissue having to do with tooth development and are so rare that they report the occurrence in a boy aged 12. There was complete right nasal obstruction. Roentgenogram revealed two displaced teeth, one near the orbital floor and the other lying apparently in the inferior meatus. A Caldwell-Luc technique revealed a very thin outer maxillary wall and the medial wall was largely destroyed. By blunt dissection the tumor mass was removed and was not ruptured until it was loosened from the floor. The two teeth were removed with the tumor mass and a third tooth was found that had not been visualized by Roentgenogram. All the teeth were well developed.

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THE EDUCATIONAL TREATMENT OF THE PRE-SCHOOL DEAF CHILD.*

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General medical men as well as otologists must awaken to their responsibility for the educational treatment of the pre-school deaf and partially deafened child. A sad apathy exists in the profession in regard to this most tragic and poignant problem. It is most important to diagnose and start educational treatment of the deaf child under the age of three years. It is with this age group that the present discussion is concerned.

Too many deaf children of six years and older are seen without any serviceable lipreading or speech ability. The present lack of effective medical or surgical remedial measures in the treatment of the child with profound nerve deafness, either acquired or congenital, has dulled physicians to hopeless disinterest. This is indeed deplorable in view of the fact that even the completely deaf child (who is a rare entity) can be taught very effective speech and lipreading. The individual possessing some residual hearing can be given intelligible and not unpleasant speech today with the educational use of the hearing aid.

Etiology — New Concepts.

Deafness of profound degree in children is usually labeled "congenital perceptive deafness" and dismissed as such. For practical reasons such a diagnosis was usually sufficient. Profound deafness severe enough to put a child into the classification of "handicapped" is almost always due to percep-

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tive (nerve) deafness; if a conductive element is present it is usually overshadowed by the perceptive element; however, a more specific etiology should be elicited whenever possible.

It is not the intention of this report to deal at length with etiological theories. The usually considered causes of congenital and acquired deafness, such as organ of Corti aplasia, spinal gangliar aplasia, meningitis, virus exanthemata, etc., are insufficient today to explain all the cases observed. Two newly recognized factors producing deafness in the infant have been noted recently:

1. *Rubella in the mother* has been rather definitely associated with the development of cataracts and other congenital lesions in the child; it may also be a cause of cochlear degeneration. We have been able to elicit a history of maternal rubella in nine deaf children. Two of these children showed other congenital defects including cataracts.

2. *Rh factor disturbances* may also play a part in the etiology of some of these cases. Several congenitally deaf children of Rh negative mothers are now being studied and will be reported more completely in the near future. Subclinical erythroblastosis in the newborn may have etiological significance in some cases of congenital perceptive deafness. It is quite possible that changes similar to kernicterus occur in the cochlea or in the ascending auditory tracts.

Diagnosis: Deafness in very young children is usually suspected by the parents, but the physician is entrusted with the responsibility of the diagnosis. This is a difficult task, since the testing of hearing is a subjective response phenomenon and since subjective responses depend not only upon the functional integrity of the end-organ (organ of Corti), normal tracts and cortical centers, but also upon the basic intelligence of the child, and since the testing of intelligence in the child is in itself no mean task, the physician has a grave responsibility.

Clinical audiometry as it is practiced on adult patients is of value to a limited extent only in the three- and four-year-

old child. It is almost a waste of time in children under three years.

The approach in testing the young child must be based on known psychological principles. Given an alert, intelligent child, the testing of hearing falls into the following patterns:

1. Eye Reflex Test — Young Infants.

With the child's interest diverted from the examiner by a game or toy, various types of sounds are produced by an assistant behind the child. Involuntary blinking, jerking of the eyeball, and even pupillary dilatation will occur if the sound stimulus is potent enough.

2. Children of Two Years and Over.

a. With the child's attention diverted as above, an assistant will call the child's name, using varying intensities of whispered, spoken and shouted voice as necessary. Eye responses and turning of the head toward the sound source are carefully observed.

b. Attempts at elicitation of frequency response range are made by employing sound sources of various frequency ranges such as drums, bells, whistles, gongs, etc. With a diversified array of toy instruments, a fairly comprehensive frequency and intensity analysis can be made — thus furnishing the examiner with a rough "audiogram."

c. A frequency modulated loudspeaker sound source may be used also to delineate further the potential frequency spectrum heard by the child.

It is not enough to know that we are dealing with a deaf child. We must attempt to discover any possible residual hearing islands so that the future training may employ amplification of any such "islands of hearing" by a hearing aid.

Accordingly, when confronted by a child who responds to no sound stimuli at all, the estimation of vestibular function is quite important.

The late Max A. Goldstein, who founded Central Institute for the Deaf, in St. Louis, stressed the importance of such vestibular studies. It is comparatively simple to do a cold caloric test by the Kobrak method on even an infant. Should such test reveal a totally inactive vestibular labyrinth bilaterally, the prognosis for the occurrence of an island of hearing is quite poor. Such a finding usually indicates a severe degree of aplasia or degeneration of the vestibular and acoustic components of the VIIIth nerve or the ascending tracts; however, an active and normal response to vestibular stimulation by ice water with nystagmus to the opposite side tells us that the vestibular apparatus is intact neurologically and that the pathological process in the cochlear apparatus is not necessarily total. Such a child may show demonstrable hearing islands later.

Within the past few years another diagnostic tool has been added to our armamentarium particularly in the diagnosis of congenital defects of the ear. The Mayer position, as recently modified by Dr. Gilbert Roy Owen, enables us to visualize the ossicular chain by the appropriate angulation of the X-ray tube. It is thus possible to determine the presence or absence of a tympanic cavity and ossicular chain in a child with a congenital defect of the external auditory canal or auricle.

Objective of Educational Treatment.

The purpose of education is preparation for life. The struggle for existence depends primarily upon the ability of the individual to get along with others, and to adjust to life situations. Communication is an absolute necessity for the existence of any animal. We must realize this fact in order to understand the urgency of teaching communication to the deafened child.

Contemporary psychological philosophy appreciates the danger to the individual of isolation. Isolationism is as archaic in personal life as it is today in national life. What could be more isolating to a deaf individual than his reliance

for communication upon sign language or finger spelling? How tragic it is to see a group of deaf adults talking to each other by grotesque and inefficient finger acrobatics!

The oral method of communication is today the only sane and rational approach for the deaf child. Lipreading, a term which is now being replaced by "speechreading," is essential to the deafened child. Without it, the development of speech is almost impossible. Accordingly, our objective today is to teach the deaf child how to understand his parents, teachers and playmates by reading not only their lips but by "reading" the entire play of expressions on the speakers' faces in terms of not just syllables or words but in terms of concepts. The child then can be taught surprisingly well to speak in an understandable manner. He must learn to "hear with his eyes" the words of his associates and to reply in distinct speech. He will then be able to take his place in society as an integrated individual who is able to "hear and talk" to all, both deaf and hearing. He is no longer an isolated eccentric who must frequent clubs of other "signers" for social diversion, but he is a practically normal human being who can go to school and to college and take his place in a normal society with a decent chance for happiness in his life.

Facilities for Educational Treatment.

Unhappily, our facilities for educational treatment of the pre-school deaf child are almost nonexistent. By "pre-school" in this paper the conception is "pre-any kind of school." It not only implies pre-grade school but even pre-nursery school. It is in regard to this latter category that we are so vitally interested in mother training. It is the mother at home who becomes our first pre-school educational approach. It is true that many of our communities have incorporated into the public school system, classes in lipreading and actual schools for the deaf; however, with rare exceptions these facilities are not available to the child who needs them most —namely, the child of two and one-half years to three years. A few schools will admit four-year-olds. Most of the schools admit deaf children at six years. All teachers of the deaf with

modern pedagogic experience will attest to the fact that it is most difficult to teach a six-year-old child lipreading and speech. Such training must be started earlier. School system laws are inelastic and since six years is considered the standard age for admission to school, the same chronological standard is mistakenly applied to the deaf child.

What is the solution to this problem? Experience at the leading nursery schools for the deaf in this country and in England teaches us that education must begin in the home as soon as the diagnosis of deafness is made, even at the age of 18 months! Given an intelligent mother, a great deal can be accomplished with the deaf child by intensive training in the home. This should be followed, ideally, by attendance from the age of two and one-half years at a modern nursery school for the deaf child.

A most interesting and successful pilot experiment in the education of pre-school children has been carried out at the John Tracy Clinic, in Los Angeles. Organized and directed by Mrs. Spencer Tracy, since 1943, this school has produced some rather interesting results. With a basic plan of education directed to the mothers as well as to the deaf children, unique and valuable results have been achieved.

An educational outline to mothers was devised, detailing home instruction courses in speech preparation, lipreading, sense training and in the proper psychological approach to the deaf child. Intensive study and lecture-demonstration work was offered to the mothers at the clinic for those able to attend, and correspondence courses were made available to out-of-town mothers who had no access to proper nursery schools for their deaf children. Lectures to the mothers have been given by lipreading teachers, nursery school teachers, psychologists, social workers, otologists and pediatricians. An intelligent understanding of the special problems presented by the young deaf child has been instilled into the minds of the parents. It is the parents who constitute our shock troops, our first line of offense in the educational battle to bring near-normality to the life of the deaf child.

During the past three years of the school's existence, 87 mothers have received regular class instruction at the clinic. Two hundred forty-one children have been screened and examined by the staff of the clinic. At the present time, 20 children and their mothers are in regular daily attendance in the nursery class. During the six weeks' summer sessions held in the past four years, 93 children and their mothers have been in attendance. There are 362 mothers throughout the United States, Canada, England, Australia, etc., who are enrolled in the regular correspondence course and who receive detailed instructions regarding home education. Over 800 mothers have now received all or part of the course. Several thousand inquiries from other mothers have been received. All of this work has been done without charge.

The accomplishments of a five-year-old child, born totally deaf, after two years' attendance at the nursery school are quite startling to anyone not familiar with the possibilities of this teaching approach. As a typical example, one little girl, age five years and three months, has a speech reading vocabulary of 1,350 words. She has an understanding of speech and language in terms of thought concepts that far exceed 1,350 words, but it is impressive, nevertheless, that by proper teaching a totally deaf child at that age could accomplish so large a vocabulary.

This same child has a speech vocabulary of 550 words. These words are all intelligible to a stranger. Both the speech vocabulary words and the speech reading words are commonly used words that apply to things and people in everyday life.

At the end of three years or more of instruction, these children, even the smallest, are ready for the first grade in a school for the deaf. They have a comprehension of language that is superior to that of deaf children who start in the school for the deaf at the age of six and continue for two years. These children have accomplished more in the two years between the ages of three and five than most deaf children who start their instruction at the age of six accomplish between the ages of six and eight. Some of them have

a far better adjustment to their environment and to normal life than hearing children. Their handicaps have sharpened their wits and their abilities to master difficulties and overcome obstacles.

In summary, it is possible and has been proved practical to teach a completely deaf child to understand approximately 1,350 words and to speak 500 to 600 words by the time that child is ready for the first grade. When one stops to realize what this means in comparison to the *status quo* throughout the world where most deaf children do not receive instruction until the age of six, one cannot fail to be convinced that the instruction of the deaf child must begin at the age of two and one-half or three. The age of three to six is by far the most important one in the formative educational life of the deafened child. We must drop all of our accepted practices and remember that we are dealing with an exceptional situation when we are dealing with a deafened child. We must see to it that the deafened child gets his start in education at an earlier age than the normal child. Several young graduates of this nursery school have gone on to regular schools for the deaf, have made outstanding records in these schools and have shown marked superiority to other children whose education was started at a later date.

This pilot experiment, therefore, at the John Tracy Clinic is of tremendous importance to educators and to otologists throughout the world who are thus able to see demonstrated clearly a workable educational plan for the pedagogic treatment of the pre-school age deaf child. It is seen that it is practical and possible to give a young child a fine beginning in speech reading and in speech vocabulary. Such a child will have a far greater opportunity for progress in the difficult years ahead when he must learn to cope and to compete with normal hearing children. We must combat the isolationism of deafness by allowing these children to have access to the finest educational opportunities at our command. School budgets must be revised with an eye to this newer development and newer philosophy in the educational treatment of the pre-school child. Teachers must not be overworked. No

teacher should be required to teach more than six children of this type.

It is suggested that such pre-school nurseries for instruction of the deaf child be started throughout the country wherever possible in connection with established schools for the deaf, and wherever not possible in conjunction with ordinary grade schools. There is a great need for teachers of pre-school deaf children as well as for all teachers of the deaf. Some definite attraction must be created to entice intelligent teachers into this work, because it is only through the educational approach that there can be a decent solution for the proper training of these unfortunate children.

The physician himself must be the first to initiate, encourage and to supervise these programs. It is the physician who must teach the educational authorities and the parents themselves the importance of these few formative years under the age of six in the life of the deaf child. Physicians in pediatrics, in general medicine and otolaryngology must be the leaders in this fight.

Finally, the physician should counsel parents to do two things at home for the deaf child: "Treat the child normally," and "Talk to the child. Talk, talk, talk!"

AMERICAN BOARD OF OTOLARYNGOLOGY.

The American Board of Otolaryngology will conduct the following examinations in 1947:

October 7 to 11 in Chicago, Ill., at the Palmer House.

Address inquiries to Dean M. Lierle, M.D., Secretary-Treasurer, Iowa City, Iowa.

VITAMIN K AND LATE TONSILLAR HEMORRHAGE.*

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Recently several reports have appeared in the literature concerning the supposed value of vitamin K in reducing the incidence of late tonsillar bleeding. It was postulated by the advocates of this therapy that late tonsillar bleeding was due to a salicylate induced hypoprothrombinemia, which the administration of vitamin K would prevent.

The authors at first administered vitamin K along with the usual Aspergum therapy in an attempt to reduce their own incidence of late tonsillar bleeding. An early analysis failed to substantiate the value of vitamin K in this regard, so that a controlled series was undertaken to study the problem.

VITAMIN K AND PROTHROMBIN.

Although it has been almost 18 years since Dam[1] began his classic experiments leading to the discovery of vitamin K, the clinical uses of the vitamin have been relatively slow of acceptance. The first uses of vitamin K were limited to the most obvious clinical applications, as for physiological hypoprothrombinemia of the newborn and for the prevention of hemorrhages in operations upon patients with liver, intestinal or biliary disease where there was a lack of absorption or production of vitamin K. During the past five years its therapeutic applications have been greatly extended, and thorough investigations have been made of its physiologic action and its relationship to other drugs. These investigations include studies of hemorrhagic disease of the newborn, hypoprothrombinemia produced by drugs (*i.e.*, sulfonamides, salicylates, dicumarol, etc.) and miscellaneous hemorrhagic syndromes.

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Reliable clinical and laboratory experiments have proven that salicylic acid or salicylates will prolong the prothrombin time when administered in large doses to animals or man, whether a normal or abnormal prothrombin time is originally present.[2,3,4] The administration of salicylates in these experiments was within therapeutic doses and continued from three to 14 days.[4,5,6] Those patients who showed a profound prolongation of the prothrombin time, upon discontinuing the drug required from one to six days to return to their original prothrombin level.[4]

In regard to the hypoprothrombinemia produced by drugs, it is believed the action takes place by one of three ways: *a.* by inhibiting the action of intestinal bacteria which normally synthesize vitamin K in the intestinal tract; *b.* by substituting for or competing with vitamin K in some of the metabolic processes; or *c.* by causing damage to the liver so that vitamin K is not properly utilized for the formation of prothrombin.

It was believed that the hypoprothrombinemia produced by salicylate therapy could be prevented by the administration of vitamin K. This vitamin is necessary for the synthesis of prothrombin, which takes place in the liver. Clausen and Jager[7] state that salicylates block the utilization of vitamin K and that this is probably the basis of the hypoprothrombinemic effect. Several groups of investigators, working independently, concluded that vitamin K would prevent a salicylate induced hypoprothrombinemia.[2,3,4,6] Shapiro, *et. al.*,[8] found that 1 mgm. of vitamin K furnishes the most reliable protection to 1 gm. of salicylate. According to Clausen and Jager,[7] vitamin K has no effect on hypoprothrombinemia previously established by salicylate therapy, but this is not accepted by all investigators.

The amount of salicylate necessary to produce bleeding tendencies in an otherwise normal individual has received much attention. Butt, *et al.*,[9] showed that when sodium salicylate was given in doses of 10 gm. a day, the prothrombin was not reduced to a hemorrhagic level in uncomplicated rheumatic fever cases. Their series consisted of 51 cases.

Quick[10] reports a patient who suffered a marked depletion of prothrombin from small doses of salicyates. He feels, however, that in such cases another dysfunction is present. He further states that "in the normal patient vitamin K will restore and maintain the normal prothrombin level, but in such patients the level without vitamin K is not low enough to cause hemorrhage." Vitamin K given in relatively large doses causes no demonstrable hyperprothrombinemia in rabbits, dogs or man, even if the individual is suffering from a congenital hypoprothrombinemia. If the prothrombin were increased above normal, it would not necessarily affect the coagulation time since the trigger substance in the clotting mechanism is thromboplastin. Quick[10] emphasizes that hypothrombinemia becomes clinically significant only if the prothrombin falls below 20 per cent of normal, as it is not until then that the patient is in danger of hemorrhage; however, if the vascular response remains normal and no trauma occurs, abnormal bleeding is not likely to occur even then.

RELATIONSHIP TO TONSILLECTOMY.

To understand the problem of late tonsillar bleeding, one must be acquainted with wound healing by secondary intention. In adenotonsillectomy, a sizable area is left raw and uncovered, which soon becomes infected superficially by the invasion of the normal bacterial flora of the mouth and throat. The reaction to the bacterial invasion, plus the normal hemorrhagic and serous exudation, soon produces a crust which finally covers the entire raw surface. This crust is continually under stress and strain by the normal movements of the regional muscles. Within 24 to 48 hours, granulation tissue begins to form beneath this crust. This tissue grows from below upward, a process requiring from five to eight days, and displacement of the crust results. As this crust slowly disintegrates and becomes dislodged, the granulation tissue becomes exposed. Since this granulation tissue is highly vascular, trauma, whether by food bolus or by movements of the tongue or regional muscles, may produce hemorrhage. As mucous membrane slowely proliferates to finally cover over

this granulating surface, the possibility of bleeding from the area is reduced accordingly. Were it not for the frequent early displacement of the crust (due to the location of the wound), secondary hemorrhage would probably be minimal, other factors being normal.

Singer,[11] who formerly practiced in Austria where salicylates are not used in the postoperative management of tonsillectomy cases, made the observation that late tonsillar hemorrhage was much less common in the clinics of Central Europe than it was in this country. The only significant difference in the management of the cases on the two continents, according to Singer, is the use of aspirin here, whereas aminopyrine is the analgesic drug in vogue in Central Europe. Since salicylate therapy is administered to postoperative adenotonsillectomies almost routinely in this country, it occurred to Neivert[12] that vitamin K might be of value in reducing the incidence of late (secondary) tonsillar bleeding.

Neivert[12] studied a series of 283 patients undergoing tonsillectomy to whom he administered both vitamin K and acetylsalicylic acid throughout the postoperative period, and found that, when examined five to seven days postoperatively, the incidence of late tonsillar hemorrhage was 1.4 per cent. Previous to this, his other patients had received abundant salicylates alone and his incidence of late tonsillar hemorrhage was almost 10 per cent. He concluded that salicylates must be avoided or they must be administered simultaneously with vitamin K. At the same time he presented several cases in which prothrombin determinations were done during salicylate therapy without vitamin K and then during their simultaneous administration, to prove the protective value of vitamin K against a salicylate induced hypoprothrombinemia.

In 1946, Preston[13] reported that, in his series, secondary tonsillar hemorrhage occurred in from 4.29 to 7.07 per cent by using aspirin alone over a five-year period. By the simultaneous administration of vitamin K he obtained 2.08 per cent late bleeding among 385 patients. Preston further stated that salicylate induced hypoprothrombinemia may become

pronounced during the hot season when "there seems to be a tendency toward deficiency in vitamin K," but no logical explanation for this assumption is offered.

Neither of these workers described the exact method employed to determine the percentage of late tonsillar bleeding, other than their observations approximately one week postoperatively. This point of possible error is stressed since, in our experience, using detailed questionnaires with careful and persistent follow-up by mail and phone, the percentages finally determined showed marked discrepancies with the original figures obtained from our case records without the questionnaire.

It was difficult for us to believe that the relatively small doses of salicylates given during the usual postoperative course of adenotonsillectomy could deplete the prothrombin to such an extent as to place otherwise normal patients in danger of hemorrhage. In addition, as pointed out by Quick,[14] the bulk of the evidence put forth to prove that aspirin does reduce the prothrombin is based on the prothrombin time of diluted plasma, which, even in the hands of skilled technicians, is inaccurate. Neivert's attempt to demonstrate by laboratory methods that vitamin K will prevent a hypoprothrombinemia in these cases, and thus lessen late tonsillar hemorrhage, is, therefore, of questionable value, particularly since too little laboratory data were presented in his series to draw accurate conclusions.

The need for additional accurate clinical and laboratory evidence was realized. It was not practical to determine the prothrombin time routinely on adenotonsillectomy admissions, and it was most impractical to determine the prothrombin time at the time of the postoperative visits to the office or clinic, especially at the time of any late bleeding. Because of this, a series was begun to test the protective value of vitamin K in relation to salicylate therapy and secondary postoperative hemorrhage in adenotonsillectomy on a clinical basis.

OUR SERIES.

A total of 504 adenotonsillectomy patients were studied. The usual pre- and postoperative examinations and observations were recorded on each. In addition, a questionnaire (see Fig. 1) was mailed to each patient or parents (in the

FIG. 1.

DR. SAMUEL L. FOX
1205 St. PAUL STREET, BALTIMORE 2, MARYLAND

Re:

Dear

I am making a survey of all the patients operated upon by me for tonsillectomy and adenoidectomy. I would greatly appreciate your answers to the following questions. An addressed, stamped envelope is enclosed for the return of this questionnaire.

Thanking you for your courtesy, I am

Very truly yours,
SAMUEL L. FOX, M.D.

PLEASE FILL IN THE BLANKS

1. Did any bleeding occur after leaving the hospital?.....
2. If so, when did it occur?.....
   Was medical attention required?.....
   Please describe .....
3. How many boxes of Aspergum were chewed after operation?.....
   Was it helpful?.....
4. Was any other medication taken for pain?.....
   If so, please describe .....

Please Return This Questionnaire in the Enclosed Envelope

case of children) approximately one month postoperatively. Self-addressed stamped envelopes were enclosed to facilitate return of the questionnaire, and repeated telephone follow-up inquiries were made until the questionnaire was returned.

By definition, bleeding which occurred within 24 hours of the time of operation is considered *primary bleeding*, and

*Acknowledgment is made to Hoffman-LaRoche, Inc., for supplying this product.

results either from inadequate hemostasis at the time of operation or from the loss of free ligatures from bleeding points. Bleeding which occurs thereafter, and especially after 48 hours, is considered *late* or *secondary bleeding*. In this series we are concerned only with the late (secondary) type of bleeding. All reports of bleeding were confirmed, but recorded in the series, no matter how minimal.

Group I in this series included 199 patients who used Aspergum as desired throughout the postoperative period. No other medication was prescribed or used, except codeine in adults. Of this number, 17 patients reported bleeding after leaving the hospital. This represents an incidence of 8.5 per cent (see Fig. 2).

FIG. 2. ANALYSIS OF CASES.

	GROUP I	GROUP II	GROUP III
Total cases	199	188	184
Number exhibiting late bleeding	17	13	2
Percentage of late bleeding	8.5	10.5	0.1

In Group II, 128 patients took 10 mgm. of Synkayvite* (synthetic vitamin K) twice daily for seven days postoperatively along with Aspergum as desired. Codeine was prescribed for the adult patients. In this group, 13 patients reported postoperative bleeding. This represents a 10.5 per cent incidence of late tonsillar bleeding.

Group III consisted of 184 patients who were not permitted to use Aspergum at all, and no Synkavite was taken by them. Codeine was prescribed for the adults (as it has been shown that codeine does not affect the prothrombin time), but no other medication was given this group. These patients were permitted to chew ordinary (candy) chewing gum freely, and most of the older children and adults did so to relieve troublesome muscle spasm. There were only two cases of secondary postoperative bleeding in this group, or an incidence of 0.1 per cent. In one of these patients with late tonsillar bleeding. the prothrombin time was found to be normal at the time of the bleeding.

Further analysis of this series showed that the average voluntary consumption of Aspergum during the postoperative period was 16 tablets (each containing 3½ gr. of aspirin), or a total of 56 gr. of aspirin. This figure is representative of both those that bled and those that did not bleed. The maximum amount of Aspergum taken by any one patient in the series was 112 tablets, or 392 gr. of aspirin. Ironically, this patient did not bleed.

Approximately one-half of those that bled required medical attention (14 out of 32). Only three of these required general anesthesia and hospitalization to effect control of the bleeding.

In this series late tonsillar bleeding occurred most often during July, August and September, but no adequate scientific explanation can be offered for this. Several factors have been suggested to account for the increased incidence during the hot season. Secondary infection and putrefaction may be more marked in hot weather, and dehydration is also more common, as the water loss is greater and the intake is usually restricted by the patient as a result of local discomfort on swallowing.

All patients in this series were operated upon by one or the other of the authors by an identical technique which consists of sharp dissection throughout and the control of all bleeding points by No. 0 or No. 1 plain catgut free ligatures.

SUMMARY AND CONCLUSIONS.

A comparison of Groups I and II in this series fails to reveal any protective action afforded by vitamin K (Synkayvite) in late tonsillar hemorrhage.

By discontinuing the use of Aspergum postoperatively, it was possible to reduce the incidence of late tonsillar hemorrhage to less than 1 per cent.

It is generally agreed that the simultaneous administration of vitamin K will protect a normal individual against a

salicylate induced hypoprothrombinemia, but the authors do not consider that hypoprothrombinemia is the cause of late tonsillar hemorrhage.

It is felt that the high incidence of late tonsillar bleeding in patients using Aspergum is due probably to some local effect on the wound.

This study has proven conclusively to the authors that analysis of a series of such patients absolutely requires a careful canvass by specific questionnaire and persistent follow-up. By this means it was determined that many patients failed to follow postoperative instructions, including prescribed medications, even when presented with a printed list of detailed instructions with specific prescriptions upon discharge from the hospital (see Fig. 3), so that conclusions drawn from office and clinic records alone showed gross discrepancies from the true facts.

FIG. 3. INSTRUCTIONS FOR CARE AFTER TONSILLECTOMY.

For.....

1. The patient should remain in bed for the first two days after operation. One the third day he may be up but must be quiet. On the fourth day he may go outdoors if the weather is good but he may not run, play or exert himself (bending, stooping, lifting, swimming, etc.) for at least seven days. On the eighth day he may return to school or to light work.

2. A daily bowel movement is important. Milk of magnesia or Fleet's Phospho-Soda are recommended. If these are ineffectual, an enema should be administered.

3. If the throat feels dry, or the breath is foul, the patient may gargle 4 or 5 times a day with a solution made by dissolving ¼ teaspoonful of table salt in a full 8 ounce tumbler of lukewarm water. *No other gargles may be used.* Children do not use gargles well. DO NOT USE "ASPERGUM."

4. Abundant fluids and an adequate diet are absolutely essential for a speedy recovery. The patient must take fluids immediately after operation and he must begin to take food the next day, as otherwise troublesome muscle spasm will result and swallowing will become very painful. If this happens, the patient must be encouraged to take food in order to overcome the spasm.

5. Frequent small meals are preferable to a few large ones. No hot drinks or food should be taken; all foods and drinks should be cold or lukewarm. The diet should consist of:

1st day: Take abundant quantities of water, milk, ginger ale, warm or cool broth, ice cream or sherbet, egg nog, and sweetened fruit juices (especially mucilaginous ones, as prune juice). These are best taken cold and in small quantities frequently repeated.

2nd day: Add soft cooked cereals, custards, soft mashed potatoes and pureed vegetables, soft boiled or poached eggs, gelatine desserts, etc. *Do not force children to eat but be sure they take ample fluids.*

3rd day: Cooked meat, if finely cut up and properly chewed, may be added to the diet. In the next four days the diet should gradually return to normal except that *dry toast, crackers and other similar food should be avoided.*

Highly seasoned and hot foods or drinks, and all alcoholic beverages, must be avoided for a period of two weeks following operation. Beer may be taken in small quantities after one week.

6. Moderate pain in the ears and slight fever (up to 100° F.) are common and of no significance. If severe, constant, throbbing pain should develop in the ear, accompanied by fever of over 100° F., notify me or your physician at once.

7. If any bleeding occurs, the patient should sit erect and gargle with a mixture of 1 part of hydrogen peroxide solution and 3 parts cool water. Ice may also be sucked. If these measures do not control the bleeding, notify me or your physician. If it is not possible to reach me by phone, take the patient back to the Hospital in a car without delay.

8. The patient should return to the office on at for examination of the throat and further instrucions.

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1205 St. Paul Street.

MISSISSIPPI VALLEY MEDICAL SOCIETY MEETS AT BURLINGTON, IOWA, NEXT OCT. 1-2-3.

The Twelfth Annual Meeting of the Mississippi Valley Medical Society will be held in the Municipal Auditorium at Burlington, Iowa, Oct. 1, 2, 3, 1947, under the presidency of W. A. Sternberg, M.D., F.A.C.S., of Mt. Pleasant, Iowa, a trustee of the Iowa State Medical Society.

At the November meeting of the board of directors the following officers were elected: President-elect, W. O. Thompson, M.D., F.A.C.P., Chicago, Ill.; first vice-president, B. J. Dierker, M.D., F.A.C.S., Ft. Madison, Iowa; second vice-president, J. F. Ross, M.D., F.A.C.S., Golden, Ill.; third vice-president, D. L. Sexton, M.D., F.A.C.P., St. Louis, Mo; secretary-treasurer, Harold Swanberg, M.D., F.A.C.P., Quincy, Ill.; accounting officer, Ralph McReynolds, M.D., F.A.C.P., Quincy, Ill. The executive committee which will have charge of the Burlington meeting comprises Dr. W. A. Sternberg, Dr. W. O. Thompson, Dr. D. L. Sexton, Dr. Harold Swanberg and Dr. J. C. McKitterick.

POLIOMYELITIS AND TONSILLECTOMY.*

CLAUDE D. WINBORN, M.D., and JOHN R. STANSBURY, M.D.,
Dallas, Tex.

Despite the many excellent and well written reports on poliomyelitis as influenced by tonsillectomy and adenoidectomy in recent years, the subject is still controversial. In all but a few serious sectional epidemics the ratio of poliomyelitis cases to the total population is relatively small; but the disease has been given wide publicity in the lay press and by the fund raising activities of the National Foundation at Warm Springs, Ga., and this has resulted in near hysteria in the parents of children in the susceptible age group when tonsillectomy or adenoidectomy is to be considered.

The subject was perhaps first mentioned by Sheppard, in 1910, and it has appeared intermittently since without serious consideration. Apparently touched off by the report of Krill and Toomey, in 1941, a widespread interest and concern has led to extensive investigations into the relationship in all sections of the country. Very little knowledge was gained from these investigations as to the mode of transmission and other immunological factors, and poliomyelitis still remains a treacherous and dreaded disease. Animal experimentation has thrown very little light on the subject and apparently has only added more confusion to the problem of finding the mode of transmission of the virus. Reliable authors have contributed extensive statistics covering periods of years and quoting the number of tonsillectomies in relation to poliomyelitis cases in various sections of the country. It is felt that some of these authors reached unwarranted conclusions from too few and too isolated cases in which the disease followed recent operation.

In order to present further evidence on this subject, it was

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decided to make a survey of acute poliomyelitis cases admitted to Parkland Hospital, Dallas. This hospital cares for the major portion of cases developing in that community and in the surrounding territory.

The survey covered the first eight months of 1946, during which 134 patients were admitted. During the first five months, or the nonepidemic period, 26 cases were admitted. During the last three months of the survey, there were 108 admissions. Of the total number of cases, 44 per cent had had a tonsillectomy, which figure approximates the normal ratio of tonsillectomized individuals to the total population in Dallas County. Apparently an unusual finding was the relationship of tonsillectomy and adenoidectomy to poliomyelitis during the quiescent period and that during the epidemic period. Of the 26 cases admitted during the nonepidemic period, 19 per cent had been tonsillectomized, whereas during the epidemic period 50 per cent had had a tonsillectomy. Four of the first group were bulbar type, only one of whom had had tonsils removed, while 18 of the latter group were of the bulbar type—16 of whom had had a tonsillectomy.

The following chart shows the length of time since the operation of all tonsillectomized cases and the number of bulbar cases in each time group.

Time After Operation	Number Cases	Number Bulbar Cases
1 Month	1	0
2 Months	2	0
3 Months	0	0
4 Months	1	0
5 Months	0	0
6 Months	2	0
7-12 Months	6	3
1- 5 Years	16	4
6-10 Years	13	3
11-20 Years	16	6
21-48 Years	2	1
Total	59	17

Thus only one patient out of the 134 had been operated upon less than one month before presenting symptoms of the

disease, and only six had been operated upon less than six months, none of whom had the bulbar type of poliomyelitis. Although the exact number of tonsil and adenoid operations done during this period was unobtainable, reliable estimates from all hospitals in the city indicated a considerable number had been done during June, July and August.

The average age of this series was 9.7 years. Of the 134 patients, 82 were one to 10 years of age, while 39 were 11 to 20 years of age, and 12 from 21 to 32 years of age; one white male was 52 years old.

There was a total of six deaths, all of which were of the bulbar type of involvement. The following table gives data pertinent to each of these cases:

Race	Sex	Age	Date of Tonsillectomy	Date Admitted
White	Male	8	None	1-17-46
White	Female	7	5-7-1944	5-26-46
White	Male	16	1937	6-21-46
White	Male	22	1928	7- 6-46
White	Male	23	1927	7-12-46
White	Male	32	1917	8-18-46

Since only one case in this substantial series developed within one month following tonsillectomy and none of the bulbar cases had developed within six months following operation, it would appear that the previously reported cases were circumstantial. The fact that a person had had his tonsils removed apparently did not alter his chances of contracting the disease; however, if he does contract the disease it is more likely to be the bulbar type rather than the spinal, a fact which is borne out by previous reports. As shown above, 17 of the 22 bulbar cases had had a tonsillectomy.

Of the entire group of 134 cases, 70 were white male, 55 were white female, three were colored male and six were colored female. Of possible significance is the fact that only 6.7 per cent of this series are colored, whereas the percentage of colored in Dallas County is 18 per cent. The majority of the colored people in this area are in the lowest income group and their living conditions and sanitary facilities are of the

poorest type. If the theory is correct that transmission by flies, poor hygienic practices and filth tend to spread poliomyelitis, it would appear that this group would be better represented.

Considerable hardship on children with sufficient indications for tonsillectomy is being evoked by over-emphasizing this disease and the allegation that recent tonsillectomy is a predisposing factor. To realize that it is over-emphasized, one need only to compare statistical data of this disease with that of other severe and common diseases of childhood. In the summary of a very logical report in May, 1946, Dr. Edward R. Roberts, Bridgeport, Conn., stated, "It is estimated that the average annual incidence of poliomyelitis in everyday life is one to 3,250 population."

No other physician knows better than the otolaryngologist the amount of damage that may result from postponing these operations too long, nor does anyone else know better than the otolaryngologist the difficulty of performing these operations during the months when the incidence of poliomyelitis is lowest and the incidence of upper respiratory infections is greatest.

CONCLUSION.

The results of this survey tend to confirm the conclusions of the more recent authors that the incidence of poliomyelitis in tonsillectomized individuals is no greater than in those individuals whose tonsils have not been removed. The danger of contracting poliomyelitis following recent tonsillectomy is minimal.

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MISSISSIPPI VALLEY MEDICAL SOCIETY 1947 ESSAY CONTEST.

The Seventh Annual Essay Contest of the Mississippi Valley Medical Society will be held in 1947. The Society will offer a cash prize of $100.00, a gold medal and a certificate of award for the best unpublished essay on any subject of general medical interest (including medical economics and education) and practical value to the general practitioner of medicine. Certificates of merit may also be granted to the physicians whose essays are rated second and third best. Contestants must be members of the American Medical Association who are residents of the United States. The winner will be invited to present his contribution before the Twelfth Annual Meeting of the Mississippi Valley Medical Society to be held at Burlington, Iowa, Oct. 1, 2, 3, 1947, the Society reserving the exclusive right to first publish the essay in its official publication—the *Mississippi Valley Medical Journal* (Incorporating the *Radiologic Review*). All contributions shall be typewritten in English in manuscript form, submitted in five copies, not to exceed 5,000 words, and must be received not later than May 1, 1947. The winning essays in the 1946 contest appear in the January, 1947, issue of the *Mississippi Valley Medical Journal* (Quincy, Ill.).

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HEARING AIDS ACCEPTED BY THE COUNCIL ON PHYSICAL MEDICINE OF THE AMERICAN MEDICAL ASSOCIATION

Aurex (Semi-Portable)	JAMA 109:585 (Aug. 21) 1937 (tube)
Aurex Model C-B and Model C-A	JAMA 120:535 (Oct. 17) 1942 (tube)
Mfr. Aurex Corp. 1117 N. Franklin St. Chicago, Ill.	
Beltone Mono-Pac	JAMA 130:637 (Mar. 9) 1946 (tube)
Beltone Harmony Mono-Pac	JAMA 133:543 (Feb. 22) 1947 (tube)
Mfr. Beltone Hearing Aid Co. 1450 W. 19th St. Chicago, Ill.	
Maico Type K	JAMA 129:32 (Sept. 1) 1945 (tube)
Maico Atomeer	JAMA 133:942 (Feb. 22) 1947 (tube)
Mfr. Maico Co., Inc. North Third St. Minneapolis, Minn.	
Mears Aurophone Model 98	JAMA 118:978 (Mar. 21) 1942 (tube)
Mfr. Mears Radio Hearing Device Corp. 1 W. 34th St. New York, N. Y.	
Otarion, Model A-1	JAMA 115:1101 (Sept. 28) 1940 (tube)
Otarion, Model A-2	JAMA 125:849 (July 22) 1944 (tube)
Otarion, Model A-3	JAMA 132:1071 (Dec. 28) 1946 (tube)
Otarion, Model A-4 Jr.	JAMA 132:925 (Dec. 14) 1946 (tube)
Mfr. Otarion Hearing Aids 448 N. Wells St. Chicago, Ill.	
Paravox Models VV2 and VV3	JAMA 128:879 (July 21) 1945 (tube)
Paravox Models VH and VL	JAMA 132:79 (Sept. 14) 1946 (tube)
Paravox Model XT	JAMA 134:365 (May 24) 1947 (tube)
Mfr. Paraphone Hearing Aid Co. 2056 E. 4th St. Cleveland, Ohio	
Radioear Masterpiece	JAMA 117:2169 (Dec. 20) 1941 (carbon)
Radioear 45-CM	JAMA 126:1151 (Dec. 30) 1944 (tube)
Radioear Model 45-M-magnetic air conduction receiver	JAMA 127:219 (Jan. 27) 1945 (tube)
Radioear Model 45-M-magnetic bone conduction receiver	JAMA 127:27 (Jan. 6) 1945 (tube)
Mfr. E. A. Myers & Sons 306 Beverly Rd., Mt. Lebanon Pittsburgh, Pa.	
Silver Micronic Hearing Aid	Report not yet published
Mfr. Micronic Corp. 101 Tremont St. Boston 8, Mass.	
Ravox (Semi-Portable)	JAMA 113:18 (Oct. 28) 1939 (tube)
Mfr. Zenith Radio Corp. 6001 W. Dickens Ave. Chicago, Ill.